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George W. Fitz, Chairman, *Editor*.
Mary Rees Mulliner. Dudley A. Sargent.
Edward M. Hartwell.

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AMERICAN

PHYSICAL EDUCATION REVIEW.

Vol. V. MARCH, 1900. No. 1.

THE PLACE FOR PHYSICAL TRAINING IN THE SCHOOL AND COLLEGE CURRICULUM.*

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Harvard University.

No one questions the value of a vigorous mind in a vigorous body, and most persons are united in the opinion that the best way to secure this desirable result is to give both body and mind a large amount of functional activity. The very possession of such bones, muscles, organs and faculties as we have, implies that they have all had an important part to play in bringing man to his present state of superiority among animated creatures. While conceding pre-eminence to the influence of the brain in the struggle for existence, we have yet to learn of a brain being developed, sustained or transmitted without a body. Admitting therefore that both brain and body are necessary parts of the human organism, the practical question arises as to the relative amount of care and attention to be given to the development of each in a scheme of education. Looking at the subject largely we find plenty of evidence that the nations that have given the most attention to the care of the body have not only been of a superior quality physically, but that they have invariably attained

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The Harvard Teachers' Association, Cambridge, August 3, 1899.
The Society of Gymnasium Directors, New Haven, Conn., December 30, 1899.
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the greatest mental pre-eminence. According to Grote the historian, Greece devoted more time to the physical training of her youth than to all other branches of education combined, and yet Galton tells us that the Greeks were as superior to us in intellectual ability as we are superior to the African negroes. Among modern nations Germany and England rank the highest in mental attainments, and yet these nations give more attention to the physical training of their school children than any others, the former through its admirable system of gymnastics, and the latter through its highly organized athletic sports and games. If we seek for further evidence of mental superiority associated with fine physiques we can find it in smaller groups than those represented by races or nations. The Fellows of the Royal Society in England probably represent as high an order of intellectual ability as any single group of men that could be selected. Yet upon the evidence of the Committee on Anthropometry from the British Association for the Advancement of Science these men average 69$\frac{3}{4}$ inches in stature and about 165 pounds in weight. The English professional class average 69.14 inches in height which is only exceeded by the Scotch agricultural population, and by the London police, who represent a body of men selected especially for their fine physiques. During my experience at Yale University from 1873 to 1878 the first divisions in scholarship were almost invariably the best divisions in gymnastics. At Bowdoin College according to the investigation made by President Hyde in 1890, the best scholars as a class were found to have the best physiques. At Harvard University it has been found that the percentage of scholarship men who show a high degree of physical power as indicated by the strength test, is fully as large as that of the great body of students, while the percentage of weaklings is really less. Dr. Wm. T. Porter found from the data obtained by the examination of 30,000 school children in St. Louis, that among pupils of the same age those who were in the highest grades were the tallest and weighed the most, and those who were in the lowest grades were the shortest and weighed the least. In 1896 Dr. Porter's discovery was confirmed by Mr. Chas. Roberts, of England, who made a similar investigation with the school children of London. Mr. Roberts found that there was a definite relation between size of body as determined by stature, weight and chest-girth, and precocity and dullness of intellect in children. In other words it has been found that the more intelligent classes are taller and heavier at corresponding

ages than the less intelligent. The same conclusion has more recently been reached by Gratsianoff in Russia and by Dr. Hastings in Omaha, Nebraska. As an illustration of the influence of judicious physical training upon a dull and sluggish state of mind the experiments tried at the Elmira Reformatory in 1886 under the direction of Dr. Hamilton D. Wey give us most convincing evidence. Dr. Wey selected some half dozen of the most obtuse dullards that could be found in the Reformatory, and had them put through a special course of vigorous physical training for one year. This class began at once to improve mentally and morally as well as physically. All of them passed from the lowest into the higher grades, and most of them maintained their improved mental standing after the period of special training had elapsed. It is a little more difficult to show the relation between a good physique and high mental attainments in individual cases, because there are many exceptions. But this is true of any deduction that can be made in regard to the human organism. If the student of biography will look up the life history of the men who have been the foremost leaders of the world in every branch of service and kind of endeavor, he will find almost invariably that they have been men with sound bodies and vigorous minds. Of course there are many men like Pascal, Darwin and Herbert Spencer, who have been able to accomplish a prodigious amount of work though suffering at times from feeble health. Nevertheless it takes a pound to balance a pound. The energy put forth in their intellectual efforts must have had a physical basis, and their bodies must have been tough and enduring enough to meet all the demands of their hard worked mental organism through a long term of years. If by cutting off the drains in one direction, and husbanding their resources in another Darwin and Pascal were able to do a great amount of work in their chosen field, this is hardly an argument against the building of better bodies as a foundation for still better service. Considering the multiform demands made upon the time and energy of a great man. I am not so sure that a little invalidism does not some times afford the best means of conserving his force and prolonging his life. But to argue that the best mental results may be attained through the agency of a feeble body, is to argue that the most work may be done by the efforts of a feeble engine—which is a physical impossibility. The body may be made feeble through the inordinate activity of the mind, but the mind is never made active and enduring through

the weakness of the body. "Cultivate the physical perfection of the body, and the mental perfection will follow as a matter of course; neglect or suppress the physical and force the mental faculties, and failure of both will certainly follow." While most persons are prepared to accept this physiological truth many maintain that it is not necessary to make any effort to give the body as a body any special exercise or training. They claim that the ordinary duties and employments of life will give one all of the physical training and development that he needs. This may have been true in primitive times when it was necessary for a man to do his own ploughing and planting, reaping and mowing, to chop his own wood, hunt his own game, catch his own fish, make his own tools, build his own house, and do the hundred and one things necessary to maintain a comfortable existence. But times have changed. Now a man does some one thing for himself and everything else is done for him. The minute division of labor and the extensive use of steam and electricity have wrought most radical changes in our methods of working and living. Not only is all of the mental work now done by one class and all of the physical work by another class, but even the mental and physical work is so divided and sub-divided, that it is possible for one to perform some necessary function in the business or industrial world by the employment of a very few muscles and faculties. Think of the mental vacuity and muscular inertness of a man who spends his life in polishing a wooden handle or watching a railroad ticket drop into a box, or who simply tends a machine that now does the work once thought possible only to human skill and intelligence. Yet these are fair examples of the mental and physical ability required of hundreds of occupations that now furnish man with a livelihood. Apart from the work of the professional classes, and that of the great organizers, financiers, inventors, merchants and executive heads, chiefs and leaders of various arts, trades and industries, which appeal to one's pride and ambition and call for a high grade of intelligence, the ordinary employments of life contribute little or nothing to man's intellectual or physical ability. In spite of all that we hear about the struggles of poverty, there never was a time in the history of the world when the great mass of mankind could meet the simple exigencies of life with so little expenditure of time and energy as today. When we consider that the prime motive that has brought man to his present state of mental and physical efficiency has been the struggle for existence, and that the primi-

tive man probably had to exercise more real mental acumen and sagacity, had to be more agile and alert, and bring into action more varied qualities of mind and body in order to live, than the great mass of our present population, some of the tendencies of our present civilization may well give us pause. We already know that there is a difference of five inches existing between the average statures and twenty pounds between the average weight of the best and the worst nurtured classes. We also know that criminals and lunatics average less in height and weight than the general community, and that there is an ever widening gulf between the physical and mental stamina of the highest and lowest stratas of society.

Inasmuch as the peculiar tendencies of our civilization have deprived the great mass of our people of an incentive to use more faculties of mind and body than they are obliged to in order to live, and inasmuch as we know that neither can be long kept from degenerating unless furnished with their customary nutriment through exercise, the question of supplying some artificial aids and means of both mental and physical development becomes one of the greatest importance. It is difficult to see how the stability and integrity of the race can be maintained in any other way. Many persons have already comprehended the problem, and the efforts that are being made to interest old and young in parks, play grounds, athletic fields, gymnasiums, public baths, museums, libraries, art exhibitions, lectures, conferences, debates, etc., are all steps in the right direction, and are doing a great deal to improve the mental and physical condition of our people. But in order to attain the best results we must carry this movement farther. We must make the improvement of the body an essential requirement of our school system. There is a tendency to regard school children as that portion of the community who are to earn their living by their mental attainments in contrast to that unfortunate part of the community who are supposed to be dependent solely upon their physical efforts. Consequently the amount of mental work has been greatly increased while the time formerly allowed for exercise, recreation, etc., has been correspondingly diminished. Parents complain that children come home from school loaded with books that they must study all the evening in order to prepare their lessons for the next day. They can find no time to assist about the house work, or to do errands and chores that would at least furnish them with some sort of exercise, but they must hurry off to school, probably by steam cars

or electrics for fear of being late. There is not a single exercise in the school curriculum that requires them to lift their arms above their heads or to use their hands and fingers except to thumb the leaves of a book or handle a piece of chalk. And yet we know that arm movements are more nearly associated with mental action than leg movements, which in walking require but little attention, and that it is almost impossible to develop the chest and thereby enlarge the lungs without using the arms. As a consequence of our one-sided method of school education we have reason to expect some unfavorable results. In the schools of this country we have but little reliable data as to the amount of disease among school children. We know that in the schools of Boston only about 50 per cent. of the pupils who enter the elementary schools ever get through the 4th grade in the grammar school and only 15 per cent. to the high schools, while less than half of that number graduate. Although many children are withdrawn and put to work to help support the family, a large number are known to drop out from ill health or inability to stand the mental and nervous strain. Those who graduate from our high schools and those who enter college represent in a physical sense as well as a mental sense the survival of the fittest. As a fair example of the amount of sickness that prevails among school children let me quote from the report made by Professor Axel Key to the Swedish government some few years ago. He says: "According to my examinations of 15,000 boys in the middle schools more than one third are ill, or are afflicted with chronic maladies. Short-sightedness, which is for the most part induced by the overtaxing of the eyes in school work, and well merits the name of school sickness, rises rapidly in height of prevalence from class to class. Thirteen and a half per cent. of the boys suffer from habitual headache, and nearly thirteen per cent. are pallid; and other diseases arise in the lower classes and then decline to rise again in the upper classes. Diseases of the lungs are most frequent among organic disorders. Diseases of the heart and intestinal disorders show a considerable tendency to increase in the higher classes. As to the average of illness in the different classes, it appears that in Stockholm 17 per cent. of the children in the first class were ill at the end of the first school year. In the second year the illness curve rose to 37 per cent. and in the fourth class to 40 per cent.

"Among the school girls, the future mothers of the generation to come, investigations instituted in thirty-five schools with three

thousand and seventy-two pupils brought out a fearful amount of illness. Sixty-one per cent. of the whole, all belonging to the well-to-do classes, were ill or afflicted with serious chronic disorders; 36 per cent. were suffering from chlorosis, and as many from habitual headache; at least 10 per cent. had spinal disorders, etc."

Sixty-one per cent. made sick in learning how to live! What sadder commentary could be made upon our present school system. It would be surprising if such a condition of ill health as portrayed by Prof. Key had not forced itself upon the attention of the school authorities, and obliged them to take measures to improve the physical status of the school children. Indeed efforts in this direction have been making for several years past, and I am pleased to state that there has been a perceptible improvement at least in the physical condition of the students who come to college. This improvement may be attributed largely to the increased attention given to gymnastics and athletics, the extensive use of the bicycle, and the increased participation in recreative games, the improvement in the sanitary condition of school buildings and dwelling houses, and the great interest taken in the selection and preparation of food products, and in matters of personal hygiene. This sanitary movement though popular with the higher classes has not yet become sufficiently general to have produced any very marked effects upon the health and physique of the great mass of pupils now attending our public and private schools.

The subject of physical training which in its best sense means applied hygiene is still regarded with indifference by most parents and teachers. Parents want their children to have a practical education as they term it, but the majority of them fail to see the bearing which physical training has upon mental acquirements which are the results most desired. The teachers feel that their reputations depend upon the amount of verbal knowledge they can pump into the heads of their pupils in a given time, and consequently look upon any kind of physical exercise as one of the many distractions that tend to interfere with the attainment of this object. The school boards are governed largely by the wants of their constituency, tempered somewhat by the opinions of head masters and teachers in the various departments. As the governing boards are usually of a practical turn of mind, the measures for physical training generally adopted after all interests are consulted, are those which promise

the most, cost the least, require the smallest amount of time, and interfere as little as possible with the existing curriculum. A scheme of physical training so hampered and restricted could hardly be expected to be very prolific in good results. It implies the making of promises which cannot be fulfilled, the employment of incompetent, half-trained teachers, the attempt to work under unfavorable conditions, without apparatus, without change of clothing, without baths, without sunlight and almost without air. Under such conditions, with no attempt made at classification according to physical needs, with everyone doing the same thing, without any moral enthusiasm on the part of the teacher, without hope of approval or reward on the part of the pupil, without even the inspiring strains of music to relieve the monotony, our public school children are put through what some persons have been pleased to term educational gymnastics. After a few years of this kind of work, is it to be wondered at that both teachers and pupils should unite in one prolonged cry for recreative exercises or for more plays and games?

Under the most favorable hygienic conditions it is very difficult to accomplish much in the way of physical improvement by giving to it only ten minutes a day. When parents and school boards expect to see defective constitutions rebuilt, vigorous health attained, and all of the physical evils and defects that have been acquired by ten hours a day of school work, removed by a few minutes a day of gymnastics under the conditions I have described, their expectations become simply laughable.

Fortunately there are a number of schools in the country where it is not thought necessary to sacrifice one's health and physical vigor in order to obtain an education, and where if a boy is prepared for college, he is prepared physically as well as mentally for the ordeal before him. But I regret to add that these schools are vastly in the minority, and that the subject of physical education has not begun to receive the attention which it merits from parents, teachers and school and college authorities.

The causes which tend to make physical training of some kind a necessity are more numerous and more urgent today than ever. Some of them arise from organic necessities. A large part of our youth must have an opportunity to exercise their motor impulses or the race would soon deteriotate. You can not suppress in one generation what hundreds of generations have been fostering and developing through necessity. When the law requires children to attend school in order that they may have their mental sensi-

bilities played upon, and be filled with enthusiasm to live nobly, act courageously and do the thousand and one things necessary to make good citizens and perform some useful function in society, it would hardly be the part of wisdom to suppose that these children were going to postpone their physical activity until they completed their mental education. Fortunately for the community in one respect though unfortunately I think in another our youth do not propose to be educated that way. Inasmuch as educators persistently ignored the claims of the body, and adhered to the old régime of mental drudgery without interest and without pleasure, school boys and college youths were forced to find interests and enjoyment in more active pursuits. At first these took the form of impromptu school games, midnight carousing, town and gown fights, and systematic hazing. In the early sixties and seventies, this inborn love for motor activity began to show itself in organized sports and games. This was the beginning of modern athletics. With the growth and development of this subject during the past 25 years most of my hearers are quite familiar. Every school and college of note has its athletic club or association, while base-ball, foot-ball and rowing clubs have increased correspondingly. The public interest in athletic contests has also increased enormously, the papers being filled with every detail in regard to practice and training, and the great foot-ball games draw together from thirty to forty thousand people to witness the final struggles. Naturally enough a subject of so much general interest operating through a quarter of a century would tend to produce certain marked results, though there probably would be a wide difference of opinion as to what these results were. In my opinion some of the favorable effects of athletics may be summarized as follows: They have afforded our school and college youth a subject of immediate interest to discuss, rally round and enthuse over. They have taught them to respect deeds rather than promises, to be governed by laws rather than by haphazard opinions, to submit to discipline, set selfish interest aside, and render obedience to their captains and leaders. Athletics have advanced the tone of youthful morals by setting higher ideals of manhood for the weak, giving a legitimate outlet for the superfluous energy of the strong and furnishing a fair field of activity for the courageous and daring. The achievements of individual athletes, clubs, teams and associations have provided live topics for written composition, and have probably afforded a better drill in the

writing of good idiomatic English than any other class of subjects. The interest aroused by athletics has in my opinion also contributed in no small degree to the enrichment of the college curriculum, by obliging instructors to make their courses more interesting and attractive in order to command attention. The management of athletics, and the handling of men under trying conditions and circumstances has afforded an admirable training in executive ability and some of our foremost young men in business and government affairs got their first experience that way. Inasmuch as a large per cent. of all of our college graduates now go into business instead of the professions, this is a matter of no little importance. Athletics undoubtedly have furnished a great incentive to a large number of youth to take vigorous exercise, and to work with definite ends in view. The extensive practice of these invigorating exercises, the adoption of the training diet, and more rational methods of living have contributed in a measure to the improvement of the general health of the community. Most of the objections which have been made against athletics have arisen more from their excesses than their legitimate uses. Nevertheless there are certain well founded objections which are worth considering. In the performance of athletic feats the young are pre-eminent. Old age and middle age yield supremacy to youth in physical accomplishments. For this reason the attention bestowed upon athletics by men of eminence and distinction is not always understood, and sometimes leads to conclusions as to the relative abilities of youth and age in more important affairs which are not always warrantable. In the opinion of many the prominence now given to athletics by the press and public, the praise and adulation bestowed upon individual athletes by schools and colleges, the commendation of friends, the worship of comrades, the celebrations and the banquets are having a demoralizing influence upon a large class of our youthful population. A young man whose good work in the class room never attracted attention, whose social charms and accomplishments never brought him into notice suddenly finds himself raised to distinction by an athletic victory. He feels for the first time in his life his own importance, and with this sense of importance comes an increasing appreciation of the method by which he has risen. Henceforth this young man's presence may be required in the recitation room, but his mind and thoughts are occupied with the scenes of his ephemeral triumphs. It is claimed that athletic contests not only fascinate the partici-

pants but allure hundreds of non-athletic young men from their studies; and thus interfere with the serious intellectual work of the schools and colleges. The protestations of the instructors are of no avail, for on the subjects of sports the whole country seems to be against them. Moreover many teachers have felt obliged to ally themselves with this athletic movement in order to have any influence over their pupils. Its power in politics in and out of college has long been manifest, every alumni dinner is overburdened with the athletic menu and hardly a college president has been appointed for the past twenty years who has not been known to favor this popular subject. The value of athletics has so impressed itself upon the mental constitution of the young men of the present day, that it is a question if those who oppose them do not lose something of their power and influence as authorities in their own special subjects. There is certainly a growing feeling among the student classes that college professors, like ministers of the gospel, are expected to preach against athletics in deference to their positions, for the strongest arguments in favor of vigorous physical exercise may be drawn from the lives, teachings and writings of these very professors. It is a serious thing to run against the positive convictions of a large body of men who have gained their knowledge by experience. If it does not breed contempt for the authority of those who oppose them, without knowledge to the contrary, it certainly tends to confirm them in the strength of their own opinions and methods of doing things. Here again we have perhaps the foundation of another argument against athletics. For many claim that they tend to cultivate an athletic frame of mind, or a combative spirit, and with this spirit a disposition to carry things by storm, and to resort to rush line tactics, in business, in politics and in war, instead of the calmer and more deliberate methods which characterize the intellectual classes. With these far-reaching efforts of athletics I do not purpose to contend. What most interests us is the effect which athletics as at present conducted are likely to have on the cause of physical education. Even admitting all the evils, and I have not mentioned half of them, that may be attributed to the popular furor over competitive sports and games, I am prepared to maintain that they are simply the result of the conditions under which we live, and of the aims and motives that incite most of us to action. Some one has said that fundamentally the great motives of conduct in life have been the hope of heaven, the fear of hell, or the love of

God. For our purpose we will assume these motives to be the hope of reward, the fear of punishment, or the love of truth. It would be difficult to think of any branch of human activity that is not influenced by one or the other of these three motives. Beginning in the nursery and extending up through all the schools and colleges, out into the professions and into every branch of business and department of labor and service, either the hope of reward or the fear of punishment holds sway. We have had a remarkable exhibition of the influence of these motives upon the conduct of the men who participated in the late war with Spain. When admirals and generals contend for rank and distinction for doing their duty, we can hardly expect school boys and college students to be unmindful of prizes and rewards, of honors and approval. The only thing in athletics that brings prizes and approval is victory, and the only way to attain victory where competition is keen and the spirit of emulation intense, is by hard, grinding work. This means that a lot of time and energy must be devoted to some one sport, and that a great many personal sacrifices must be made. As a general thing the school or college which has the largest number of men to select from, and will devote the largest amount of time and money to athletic training, will win the greatest number of athletic victories. If other institutions are willing to enlarge their field of selecion and pick up ready-made athletes all over the country, and give them an equal amount of training, they in turn will be likely to attain more than their legitimate share of athletic victories. To be always successful in athletics will certainly advertise a college but it advertises it the wrong way, for it simply implies that that institution is devoting more time to athletics than to anything else. Soon after coming to Harvard in 1879, one of the first things that occurred to me in attempting to organize my department and to insure harmonious relations between the different academic and athletic interests was the necessity of getting the different colleges to come to some agreement as to the appointment of athletic trainers, the classification of competitors, and the number of years they were to be allowed to compete, the condition under which the contests were to be conducted, etc. An intercollegiate committee was appointed to draw up regulations and recommendations covering these points. The several college faculties, however, in deference to the wishes of the students and alumni refused to adopt the regulations of the intercollegiate committee and the matter was dropped. It is interesting to note

at this time, that nearly all of these regulations have since been adopted by the students themselves, and that they have even exceeded the expectations of the faculties and put an academic requirement on all competing athletes at the intercollegiate games. Thus it has taken about 20 years, a new college generation, and an immense amount of fussing and fuming, to bring about a reform, the necessity for whieh was perfectly apparent a long time ago to the executive heads of most of our colleges, and to those who were in a position to know the facts. Given two absorbing interests, one appealing to the mental side of one's life, the other to the physical side, if competition required that the standard of both mental and physical work should be continually raised, a time would soon come when it would be impossible for the same person, unless extraordinarily endowed, to reach a high degree of excellence in both mental and physical attainments. When this time arrived it would be necessary for the person who desired to attain a position above mediocrity to decide whether he was to devote the greater part of his time and energy to mental or to athletic pursuits. This time arrived at Harvard some years ago. An examination of the college rank list showed such a dropping off in mental attainments among the athletic men that the faculty felt obliged to require a certain class-room standing of all competing athletes. The same measures have been adopted at Yale, and as I have already intimated the students of these two universities now insist upon the athletes of other colleges giving equal evidence of their rights to compete as college students. No one who knows anything of the fundamental necessities of amateur athletics, that is to insure men competing on equal terms as far as possible, will question for a moment the justice and desirability of the students' action in this matter. On the other hand no one who recognizes the aims and purposes of our institutions of learning, will hesitate to commend the wisdom of college faculties in requiring college athletes to give satisfactory evidence of their mental abilities. The very existence of such places as gymnasiums, boat-houses, athletic fields, running tracks, tennis courts, swimming tanks, etc., in connection with schools and colleges implies that they are expected in some way to further the main objects of these institutions. No one will admit that they were simply to develop athletes as such, or simply to make student athletes, but all might unite in the opinion that they were designed to develop athletic students. As I have already intimated there never was a time

when vigorous, athletic qualities were so much needed among educated men as at the present day. The demands of the times are not so much for a few brilliant or deeply learned men, as for a large number of highly intelligent men. Men who not only have the courage of their convictions, but the physical hardihood and mental tenacity to enable them to stay in their places and work at their post of duty after their more brilliant associates had wearied of well doing and dropped out of the struggle. The qualities that enable men to endure are not the overwrought, high strung conditions of nerve and muscle that sometimes win athletic victories, but rather that perfection of structure and harmony of function that usually assures good health. This condition cannot be maintained without giving a certain portion of one's time to some kind of muscular exercise inasmuch as 45 per cent of the whole body is made up of muscular tissue. When I first went to Bowdoin College some thirty years ago, it was customary for many of the students to work upon farms, or in shops, mills, or at some other kind of physical labor for half of the year in order to earn money enough to pay their college expenses. During my first years here at Harvard there were students connected with the university who were defraying their expenses by doing manual labor, and there are a few who are helping themselves along by their physical efforts at the present time. But the conditions of college life are so different now from what they used to be, that it would be exceedingly difficult for a student to earn enough money by manual labor, even if he could get it to do, to defray his college expenses, and keep up with his studies at the same time. It would be much easier for him to earn money by teaching or doing some kind of clerical work, though this would not give him the change from mental to physical effort which his system so much needs. The college authorities recognize how hard it is for a young man to earn his own way, and do the necessary mental work to entitle him to a degree. Because of this difficulty arrangements are made to furnish assistance to meritorious students in need of pecuniary aid. Harvard University invests something like $90,000 annually in the abilities of some 250 young men, in hopes of getting at least a fair return for this outlay in the good service these young men are likely to render to the community in the future. But what is the University doing for assistance of the large number of students who are poor in physical capital and vital resources, upon which their ability to render service of any kind

so largely depends? Harvard furnishes, without doubt, the largest plant, and the best general equipment of any institution in the land for improving the physical condition of the students, but right into direct competition with this splendid opportunity she has brought all of her honors, prizes, pecuniary stipends and rewards, and the personal power and attractiveness of some 400 instructors to keep the students from getting the very physical benefits the athletic equipment of the University was designed to give them, and which of course all of the faculties and governing boards are desirous for them to have. But as though all of these opportunities for honors, rewards and distinctions were not enough the University holds over the head of each student a requirement of 18 courses, and the dread punishment of withholding its diploma, should he fail to attain a certain rank in scholarship. Now what are the motives that incite one to regular systematic physical effort? We have already referred to the honors and rewards that come to victorious athletes, and the same class are also stimulated to action through dread of the chagrin and disfavor that follows defeat, or the failure to realize the object for which they have been striving and training. But even admitting that athletic honors and distinctions furnish just as laudable motives for physical activity as college degrees and scholarship honors do for mental activity, the chances for any considerable number of students attaining athletic distinction is very small indeed. At Harvard University not more than 10 per cent of the students ever attain positions on the various athletic teams, and not more than 20 per cent of the whole number ever try for them. That leaves over 70 per cent of all the students at Harvard without any motive for physical training such as appeals to them in other departments of college activity, and in all the varied pursuits of life. To be sure there is the grand motive of the love of God and truth and the attainment of health and physical perfection for its own sake. Although these high aims and motives are beginning to appeal to many persons as part of the divine plan of evolving a better condition of affairs, I fear there is little hope of getting our schools and colleges to adopt them as a fundamental basis for mental activity. If therefore as practical educators we would have the physical department act in harmony with the other departments of education, we must adopt the same method of stimulating pupils to active efforts which they do. That is we must furnish them with some im-

mediate and imperative motive for action. At the present time it is possible for a student to attend a course of lectures on physiology and hygiene, write down the results of another man's intellectual efforts, commit them to memory, and a few months later re-write them in an examination book, and get credit for his labor towards a degree. If on the other hand the same young man is moved by the words of the instructor to reform his habits of living and improve his physical condition, he may work faithfully and well for four years in the gymnasium, thereby making himself as anyone will admit a better man for anything he is likely to be called upon to do, without receiving the slightest recognition for his efforts from the faculty. The difficulty of the mental as well as the physical efforts involved in the two processes, and their relative value, I must leave my hearers to determine. Inasmuch as the only motives in the way of prizes, honors, distinctions, etc., which the physical department can offer, seem to conflict with the best interests of college life and have proven inadequate for the great majority of students, why not adopt identically the same motive for physical efforts as for mental efforts, and place all to the credit of the man who is striving for a degree. Of course everything depends upon credit being given for work actually done, the presumption being that every earnest, systematic effort, mental or physical, on the part of the student, is for his personal improvement. If it were otherwise intended it would not be permitted by the college authorities. The adoption of the credit system would tend to bring all of the work of the physical and academic instructors into harmony, for all would be working with the same end in view, the improvement of the whole man in hopes of making him a better citizen and a more creditable representative of the college. The adoption of such a measure would also insure to the college, not only that student athletes should not carry their athletics to such an excess as to lower their rank and mental standing, but that scholarship men should not carry their mental work to such an excess as to impair their health and physical standing. If the colleges and universities would make physical training an essential part of their curriculum and give credit for the results attained, the fitting schools would be induced to prepare all their pupils physically as well as mentally for their college course. We have already seen that the pupils as a class who have the best physiques are able to do the best mental work. Would it not be wise therefore to recog-

nize the value of physical training as an essential perquisite to the attainment of the highest intellectual results in a school, a college, a community, or a race? After thirty years' observation in this field of endeavor I cannot help thinking it would.

AN OUTLINE OF THE DEVELOPMENT OF PHYSICAL TRAINING IN GERMANY IN MODERN TIMES.

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II. THE DEVELOPMENT OF POPULAR GYMNASTICS (VEREINSTURNEN).* A. THE LIFE AND WORK OF FRIEDRICH LUDWIG JAHN.

1. *Preparation.* 1778-1809. Close to the north bank of the Elbe, on a line drawn from Hamburg to Berlin and half-way between the two cities, lies the small country village of Lanz. It is in the northwest corner of the Prussian province of Brandenburg, hardly ten miles from the southern boundary of Mecklenburg, and across the river from the line that separates Hanover from the Altmark—the former an independent kingdom at the end of the last century and the latter a part of Brandenburg. Since the neighboring marshes were drained by Frederick the Great the ancient village has been the centre of a rich hop-growing region, where fertile farms and wide meadows alternate with forests of pine and stretches of sandy soil. Its population consisted of a few dozen families of comparatively well-to-do peasants, who for the most part owned the farms they cultivated and enjoyed a large measure of old German freedom; for there was no manor house, and the relation of lord and vassal was almost unknown.

Among them lived Alexander Friedrich Jahn as pastor, from 1768 till his death in 1811, at the age of 68 years. One of his ancestors, fleeing from the religious persecutions in Bohemia before the Thirty Years' War, had settled in the neighborhood, and there the descendants, most of them Protestant clergymen, had remained. He was above the medium height and powerfully built, an excellent preacher, scrupulously faithful in performing the duties of his office, interested in the school, and leader of a small theological club which usually met at his house. Although a large part of the considerable parochial estate was leased, he cultivated his own hops, raised his sheep, and took pleasure in tending his

*The first article, on the Philanthropinists, appeared in the REVIEW for March, 1899.

garden. He had married Dorothea Sophie Schulze, from Neustadt in Mecklenburg, a strong courageous woman of Puritan type who made him a devoted wife. Simple, neat and active in her habits, and almost harsh in the treatment of herself, very economical and yet giving liberally upon occasion, she spun and wove much of her clothing and did not differ greatly from the peasant women in outward appearance. She was devoutly religious and never guilty of a coarse expression, but could be excited sometimes to violent outbursts of anger against the enemies of God and her son's persecutors. Unlike her husband, she had no ear or voice for music. The pastor was a good manager and his house was the abode of simple comfort. Adjoining the carefully-kept garden rose a straw-roofed farm building, and the plain one-story dwelling with its gable-room facing the village street. Not far away stood the low, thick-walled church in its green yard.

Into this home came two children—Maria Elisabeth Anna, born May 20, 1776, who in 1804 married Pastor Tittmann, afterwards her father's successor at Lanz, and died childless in 1833; and Johann Friedrich Ludwig Christoph,* the subject of this sketch, born August 11, 1778. The first thirteen years of the boy's life were spent at home, under the instruction of his parents. When he was four years old his mother began to give him lessons in reading, out of Luther's translation of the Bible—a book, which, in time, he came to know thoroughly, sharing her special fondness for the Old Testament and the Psalms. He could repeat many portions from memory, and give references to chapter and verse for passages quoted in his hearing. As a punishment for naughtiness she used to make him read the proper names in the books of Kings and Chronicles. History, geography and the German language, the chief subjects taught him by his father, soon became his favorite studies and continued to interest him profoundly throughout his school and university days. After the Bible, his first reading was done in Pufendorf's account of the Great Elector's deeds, and in the historical works of Frederick the Great. Of that monarch, who died when he was eight years old, the boy had early become a devout admirer and an ardent champion; for among his first companions were veterans of the Seven Years' War who had settled in the neighborhood—Ziethen's hussars, Seydlitz's troopers and Schwerin's grenadiers; and other troopers who visited the region from time to time, attracted by the

*After the appearance of his second work, in 1806, he dropped the first and last of these names.

rich grazing it afforded, brought fresh stories of the famous king. At the age of nine he was a diligent reader of the newspapers and interested in current events. His father also admitted him to the meetings of the theological club, and even allowed him an occasional share in its discussions. He possessed marked natural ability, quick perceptions and an unusually retentive memory; but this home training was, on the whole, neither systematic nor methodical, and interruptions were frequent. His knowledge, therefore, outside the branches already mentioned, seems to have remained imperfect, for in later years he was unable or unwilling to fill the gaps due to the absence of orderly and well-balanced education during childhood.

In other directions, however, his training was less deficient. From the visiting troopers he learned to ride; a man who had been a whaler taught him to swim; running and jumping were as natural to him as to the animals on the farms or in the neighboring forest where he roamed; the monkeys in the Duke of Mecklenburg's park at Ludwigslust gave him lessons in climbing whenever some interesting event led him thither; he learned the use of firearms from Mecklenburg poachers, accompanied the smugglers of his native village on their trips across the border, and soon came to equal or surpass them in knowledge of roads and foot-paths. With his father he went to market the hops at Dannenberg, beyond the Elbe in Hanover, and other hop-growers took him to Lübeck, Rostock and Wismar. At the last of these places, then a Swedish town, he saw the sea and ocean-going vessels for the first time. He also helped his father in the garden and at planting trees and hedges, sharing the pastor's fondness for such pursuits. Not allowed to mingle much with the peasant children, he made no intimate friends among those of his own age; yet he tells of defending a hilltop with other playmates against storming parties, and of winter campaigns against the Schnakenburg schoolboys, across the river.

Some elements of a real childhood were missing; his intellectual intercourse was almost wholly with adults, fairy tales were a thing unknown to him, and although gifted with a well-developed sense of rhythm he had inherited his mother's lack of a musical ear. He grew up fearless and self-reliant, for the active outdoor life had strengthened an originally frail body and given him great powers of endurance. The conditions in his native village and his own considerable freedom from restraint developed a strong spirit of independence, and at the same time he had received from his

father a keen sense of right and justice. Living as he did, near the frontiers of three German states, making frequent visits to relatives in Mecklenburg and Hanover, and at least one to Swedish Pomerania, it is not strange that to him all Germans were alike and citizens of one common country. The frequent quarrels to which provincial jealousies gave rise at the annual fairs excited in him only surprise and displeasure.

On the 8th of October, 1791, the boy Jahn was received into the second class in the *Gymnasium* (secondary school) at Salzwedel, once a Hanseatic town and one of the oldest places in the Altmark. It lies southwest of Lanz, on a navigable branch of the Elbe. Not much is known of the three years which were spent there. Some of the teachers were able to understand him and appreciate his efforts, and these he afterwards held in grateful remembrance. By others, however, his embarrassing questions and keen, unexpected remarks were regarded as signs of insubordination and a menace to the good order of the school. This led to a state of almost continual warfare, and made endless trouble for the rector. He had not been accustomed to the constant writing required, and managed to get excused from it because it gave him cramps in the fingers. The outdoor life was continued. He got hold of a gun, with which he is said to have made the gardens and neighborhood of Salzwedel unsafe. The game of hill-storming was resumed with fellow-pupils, and there were the usual conflicts with boys of the town. When locked out after dark he used to climb a linden tree in front of the linen-weaver's with whom he lived, and swing himself into his upstairs room from the branches. One night a joiner in the same house was firmly convinced that the place was haunted when the boy, concealing himself in one of the coffins in the shop, suddenly discharged a succession of blows, kicks and noises of all sorts.

The disagreements with teachers led at last to his leaving Salzwedel, and on the 27th of September, 1794, he entered the *Gymnasium zum Grauen Kloster* in Berlin. His stay there was short. Apparently the same spirit of independence and his rough, uncultivated manners soon brought him into difficulty with his teachers. He was proud, sensitive and poor, and this together with the traits already mentioned, no doubt prevented his living on good terms with the other pupils. However that may be, he departed suddenly and without taking leave, on April 17th, 1795, was taken sick at the house of a friend in Altmark, and later returned to his home at Lanz, where he remained till the next year.

His university career was no less disturbed and stormy. For five years he was a student at Halle, entering the university there on the 27th of April, 1796, at the age of 17. His father wished him to study theology, but his own strong predilections for the German language and for German customs and history diverted the most of his time and thought to these subjects. His habits remained desultory. Although he attended lectures, and in the philological seminary of F. A. Wolf won that scholar's commendation for his "language instinct," his work was interrupted by frequent journeys on foot to all parts of Germany. Few of the courses begun were completed in orderly fashion. After two years at the University, his hatred of their narrow provincialism, dissolute manner of life and frequent dueling led him to declare war on the so-called *Landsmannschaften*, student clubs which were the predecessors of the present *Corps*, and whose sectional character appears in their names—Westphalians, Pomeranians, Silesians, Magdeburgers, Anhalters, etc. Hatred increased to almost fanatical opposition, and this led to incessant brawls with other students.

It was partly to find refuge from his persecutors, no doubt, that he often withdrew to a hole in the rocks, still spoken of as "Jahn's Cave," across the Saale from Halle and a mile or two down the stream. We are told that he even spent an entire summer there, day and night, living in part on potatoes which he raised himself. In its seclusion he read W. Fr. von Meyern's "*Dya-Na-Sore*,"* which made a profound impression upon him. One result of the reading was his first manuscript, sold in 1799 for ten *Thaler* to O. C. C. Höpffner and appearing under the latter's name the following year with the title, "The Promotion of Patriotism in Prussia."† Here he put in concrete and practical form some of the ideas expressed in the Austrian officer's romance. Beginning with a glorification of the Prussian state and rulers, he complains that the people are ignorant of their history, charges the schools and universities with being largely to blame for this condition of affairs, urges that in the present stormy times the study of history needs especially to be fostered, argues that it is more important than the erection of monuments and indeed necessary to give them

*Dya-Na-Sore oder: die Wanderer. Eine Geschichte aus dem Samskritt übersetzt." Vienna and Leipsic, 1787-90.

†Uber die Beförderung des Patriotismus im Preussischen Reiche. Allen Preussen gewidmet von O. C. C. Höpffner. Halle, 1800. Pp. 48.

value, and suggests that historical days should be celebrated and great heroes canonized as the Catholics do their saints.

Jahn's increasing difficulties with the student clubs and his efforts to unite against them all students outside their ranks sufficiently explain his coming into conflict with the academic authorities at last, and the departure from Halle which followed. Under an assumed name he lived for a time at Jena, keeping up there the same passionate struggle against the *Landsmannschaften*, and winning a considerable following of students by his eloquence.

May 31st, 1802, he was received into the University of Greifswald, in what was then Swedish Pomerania. Here, too, he lived under a false name, enrolling himself as Andreas Christlieb Moritz Fritz from Lubben in the Lausitz. Apparently it was a desire to study the northern languages that drew him to the place. He attended the lectures of E. M. Arndt, and enjoyed intercourse with him and with others who had travelled in foreign countries. Although destitute, his clothing threadbare and by no means free from holes, and living largely at the expense of fellow students, he soon became a recognized leader among them. It was rumored that he belonged to the Unitists, one of the secret orders which were then making their appearance in the universities, and whose members, when detected, were treated as political offenders and expelled without mercy. Before many months had passed, some wild student pranks and a factional feud which led to blows brought him again into conflict with the academic authorities, and on February 7th, 1803, together with a fellow student he received the *consilium abeundi.*

After making, as it seems, a vain attempt to continue his studies at the University of Frankfurt a. O., and still retaining the name of Fritz, he lived for two years as a private tutor in Mecklenburg, first in the family of Baron Lefort, at Neubrandenburg, and then with glass-maker Strecker at the Torgelow glass-works, twenty-five miles to the west. These were years of calm after the stormy and extravagant university life. They brought him the esteem and lasting friendship not only of his pupils, but of parents and neighbors as well, in Torgelow at least. His leisure moments were devoted to literary labors, the fruits of which appeared later on.

The year at Neubrandenburg also witnessed a foreshadowing of what was afterwards to make famous the *Hasenheide* near Berlin. Every evening at 6 o'clock Jahn went with his pupils to

a brook near the town, and there gave instruction in swimming not only to them, but to other boys who happened to be present. His unusual talent for leadership soon asserted itself. The number increased to 20 or 30, most of them strangers to him and with no claim upon his services. After the bath he led them to a height nearby which commanded a beautiful view over the surrounding region. Here, he taught them running, climbing, jumping, and especially wrestling. He divided them into two parties nearly equal in strength and skill, one of which defended the height, while the other attempted to storm it; or one part were "thieves," who scattered themselves about the neighborhood and were sought out and seized by the others, the "watchmen." These games often lasted till 9 o'clock or later. There was frequent occasion for break-neck leaps, and torn clothes and bloody heads were daily occurrences. When the late fall put an end to such sport they cut down brush and stakes, and with the bundles, which he taught them to make, built on the steep slope paths, steps and seats of turf. Even in winter he led them out to plunge down through the masses of snow which hung over the edges of deep cuts into the drifts below. He had already come to realize that if the foreign foe was to be successfully met the German people must become vigorous, manly and united, and he made no secret of his political views. Some of those early companions, among them Baron Lefort's oldest son, afterward served with him in Lützow's Volunteer Corps, in the War of Liberation.

Towards the end of September, 1804, Jahn left Neubrandenburg for Torgelow. A year later, on October 1st, 1805, he took public leave of his friends in Mecklenburg through the columns of the "Strelitz'scher Anzeiger," signing himself "J. L. Ch. Fritz Jahn, formerly known as Fritz only." His next move was to Göttingen, whither he went intending to fit himself for a position as *Privatdocent*, and with several literary works in mind or already under way. Some months were spent in linguistic studies at the University, and in the summer of 1806 he removed to Jena, where he completed a volume of "Contributions to High German Synonymy."* All through his university years he had made frequent and sometimes extensive journeys on foot over Germany.

*Bereicherung des Hochdeutschen Sprachschatzes versucht im Gebiethe der Sinnverwandschaft, ein Nachtrag zu Adelung's und eine Nachlese zu Eberhard's Wörterbuch von J. F. L. Ch. Jahn. Leipsic, 1806. Pp. XLVIII., 99.

He speaks of dwelling under five kings and three dukes, seeing the life of ten universities, and becoming thoroughly familiar with capitals and manufacturing towns, besides villages without number, and the common people of all classes. On his travels he had been a keen observer of the country and its inhabitants. Taking especial interest in the popular dialects, he had, in fact, "looked the peasant in the mouth," and collected a mass of old sayings, proverbs and tales; so that the book of 1806 was a fresh contribution from the common life.

It seems that he hoped to get a footing in the University at Göttingen, but in the fall of the same year, while he was on a sojourn in the Harz Mountains, events occurred which suddenly changed his plans and turned his thoughts, as he says, from the lecture-room to the camp. From his schoolboy days he had been profoundly influenced by the changes in progress throughout Europe, and especially concerned with whatever affected the German people. A knowledge of the conditions in Germany at that time, and the events which led up to the War of Liberation, forms therefore a necessary introduction to the study of Jahn's later movements, explaining as it does the motives that prompted him to undertake the work upon which his fame chiefly rests.

The Peace of Westphalia at the close of the Thirty Years' War, by freeing the princes of the separate German states from imperial control, had made them independent rulers in their own domains, and little by little the Holy Roman Empire had ceased to exist except in name. "The traveller in Central Germany used, up to 1866, to be amused to find, every hour or two, by the changes in the soldiers' uniforms, and in the color of the stripes on the railway fences, that he had passed out of one and into another of its miniature kingdoms. Much more surprised and embarrassed would he have been a century ago, when instead of the present 29 there were 300 petty principalities between the Alps and the Baltic, each with its own laws, its own courts (in which the ceremonious pomp of Versailles was faintly reproduced), its little army, its separate coinage, its tolls and custom-houses on the frontier, its crowd of meddlesome and pedantic officials, presided over by a prime minister who was generally the unworthy favorite of his prince and the pensioner of some foreign court. . . . . National feeling seemed gone from princes and people alike. Even Lessing, who did more than anyone else to create the German literary spirit, says, 'of the love of country I have no concep-

tion; it appears to me at best a heroic weakness which I am right glad to be without.' "*

"In Louis the Fourteenth's time, French influence became dominant in Germany, no less in poetry and criticism than in matters of dress, furniture and etiquette; and the ambition of German men of letters was to put off what they were hardly ashamed to call their native barbarism, and imitate the sparkling elegance of their Western neighbors and enemies. French was the fashionable language; French ideas and modes of thought were no less supreme than Greek ideas had been at Rome in the last century of the Republic; French men of letters and science were imported, as apostles of enlightment, by the best of the German princes, just as Germans have in later times been drawn into Russia by the czars."† It is well known that this was true not only in the case of the petty states, but even at the court of Frederick the Great.

Under such circumstances the widening encroachments of Napoleon encountered little serious opposition. Step by step "all the German sovereigns west of the Rhine had been dispossessed, and their territories incorporated with France, while the rest of the country had been revolutionized by the arrangements of the peace of Luneville and the 'Indemnities,' dictated by the French to the Diet in February, 1803. New kingdoms were erected, electorates created and extinguished, the lesser princes mediatized, the free cities occupied by troops and bestowed on some neighboring potentate. . . . By the act of the Confederation of the Rhine, signed at Paris, July 17, 1806, Bavaria, Würtemberg, Baden, and several other states, sixteen in all, withdrew from the body and repudiated the laws of the Empire, while on August 1st the French envoy at Regensburg announced to the Diet that his master, who had consented to become Protector of the Confederate princes, no longer recognized the existence of the [Holy Roman] Empire."‡

Finally, when Napoleon's incursions and his insolent treatment of Prussia threatened the very existence of that kingdom, Frederick William III. was forced to take up arms; but his ill-prepared and poorly officered troops were an easy prey for the French at Jena (October 14, 1806), the great fortresses were surrendered one by one and garrisoned by the enemy's soldiery, the royal fam-

*Bryce, the Holy Roman Empire, 8th edition, Chapter XIX.

†Bryce, *l. c.*, Supplementary Chapter.

‡Bryce, *l. c.*, Chapter XX.

ily was compelled to flee from Berlin, and at Friedland (June 14, 1807), the Russian allies met a decisive defeat. The Treaty of Tilsit (July, 1807) deprived Prussia of half her territory and imposed other harsh conditions which reduced her to a mere province of France, overrun by the soldiers of the conqueror and entirely at his mercy. Jahn's most notable work was done during this period, in the years immediately preceding and following the great popular uprising of 1813, known as the German War of Liberation, which culminated in Napoleon's final overthrow at Waterloo two years later.

While he was in the Harz Mountains in the fall of 1806, Jahn first learned that war was inevitable. He immediately gave up his visit and hastened toward the army which was gathering in Thuringia. intending to volunteer his services. Delayed by swollen streams, he reached Jena on the day of the battle, saw the last struggle and the crushing defeat, and joined the fleeing soldiery as a "volunteer fugitive." So great was the impression made upon him that on the night which followed, his hair, it is said, turned gray. The flight led him by wide detours to Halle and Magdeburg, down the left bank of the Elbe almost to the point where the river bends sharply to the west, across it and northeast by roundabout ways to Swinemünde on the Baltic, where he sought in vain to secure passage by boat for some seaport to the east. Thence he turned westward along the coast and made his way though the sea-towns of Swedish Pomerania and Mecklenburg to Lübeck, reaching that city on the 5th of November, in time to see it entered by the Germans, but on the next day taken by the French and looted. He seems to have wandered next into Silesia; but here the French were everywhere, and so he returned to Jena, remaining there until the Treaty of Tilsit. Afterwards he took up his residence with a friend, district magistrate von Laffert, at Dammeretz on the right bank of the Elbe, some distance below Lanz, and there he lived for the most part till the fall of 1809, spending a portion of his time at home, however. He also went on various journeys meanwhile, undertaken in the interest of the German patriots.

Before the outbreak of the war Jahn had been engaged on two works, a "Handbook for Germans,"* and "German Nationality."† Both seem to have been already in manuscript, but lost

*Denkbuch für Deutsche.

†Das deutsche Volksthum.

during the days of flight and wandering that followed the battle of Jena. The former was not rewritten, but the latter was again completed in 1808 (the introduction is dated October 14, at Lanz) and appeared at Lübeck in the spring of 1810.† In this, his chief literary work, the great central thought is the unity of Germany; here his controlling passion for the German language, customs and history, his intense love for the fatherland, and his desire to see it bound together into one strong nation, able to throw off the foreign yoke, found full and forcible expression. Almost forty years later he closed his so-called *Schwanenrede* (last address) with these words: "Germany united was the dream of my childhood, the dayspring of my youth, the sunshine of middle life, and it is now the evening star which beckons me to everlasting rest."

Late in December of 1809 Jahn arrived at Berlin, where, as he says, love to the fatherland and his own inclination led him again to teaching. Disappointed in his original idea of finding a position in the new Berlin University, and failing to receive a promised head-mastership at Königsburg when the results of his faulty school and university training became apparent, he at first received some private pupils, but entered a training school for teachers‡ (Easter, 1810). He also began to give instruction in history, German and mathematics in an associated school, the excellent *Gymnasium zum Grauen Kloster*, the same institution from which he had run away fifteen years before. This position he retained for a year and a half, till Christmas, 1811, and in the meantime he had been given some classes in Dr. Plamann's flourishing Pestalozzian School for Boys. The long years of apprenticeship had at last come to an end, and the *Meisterjahre* were begun.

II. *The Hasenheide*, 1810-1815. It was the custom at the *Gymnasium zum Grauen Kloster* to take the pupils of the lower classes out-of-doors on some of the Wednesday and Saturday afternoons, and in the spring of 1810 Jahn began to make this his practice. He was at that time living in Krausenstrasse in the southern section of the city, from which the nearest way to the open country lay through the Halle Gate. Near this gate, there-

† Deutsches Volksthum von Friedrich Ludwig Jahn. Lübeck, 1810. Pp. XXIV., 459.

‡ Der Königliche Seminar für gelehrte Schulen.

fore, or on the meadows between it and the Kottbus Gate, he used to meet the boys from time to time, and sought to amuse them by games or such exercises as running,jumping and wrestling; or he went with them farther south to the *Hasenheide*, or the *Rollberge* and the *Tempelhofer Berg* adjoining it. The *Hasenheide*, close to the city and on the slope which leads up to the low sandy plateau bounding the valley of the Spree toward the south, was then a hilly and wooded stretch of land, in a region little cultivated as yet. It contained a few public houses, visited chiefly on Saturdays and Sundays. At first Jahn had taken only the younger pupils with him, but soon certain scholars from the upper classes who had happened upon him on their botanical excursions and been struck with his exhibitions of strength and skill, and with the apparent enjoyment of his companions, spread the news among their mates. A few of them overcame the prevalent disdain for members of the lower classes sufficiently to join the band. They were welcomed by Jahn, and thus encouraged continued to spend their leisure hours with the younger boys.

The first portable apparatus consisted of a pair of jumping-stands, furnished by Jahn—two light poles tipped with iron points so that they could be thrust into the sand, and a rope with a sandbag at either end which could be placed across them. Next came some light poles or wands which were used as spears for hurling, but without a fixed target. Occasionally so-called preparatory jumping exercises, borrowed from Guts-Muths, were practiced. But the games were at this time the chief thing, *i.e.*, "Black Man," and especially "Robber and Traveller," the latter afterwards called "Knight and Citizen." A fowler's hut in the southeast corner of the *Hasenheide* served as a robbers' den, and a space about the foot of a beautiful oak as the city or castle from which the travellers set forth. This was to them a fascinating game; a struggle between two parties unequal in numbers but matched in strength, a combination of hide and seek, flight and pursuit, running and wrestling, where powers were developed which they were quick to see might one day be put to good use.

The horizontal limb of an oak served for the first attempts at "chinning"; they jumped down into the sand and loam ditches of the *Rollberge*, or stormed up their rather steep sides. Jahn knew how to vary the exercises, giving to each its own charm, and he made the moments of rest pass pleasantly with jokes and banter, or tales drawn from history or his own experiences. Few of the boys were able to walk even short distances without fa-

tigue, and he set out to overcome this condition at once. As the fall approached he made an afternoon journey on foot with ten or twelve of them to the *Britzer Heide*, southeast from the *Hasenheide*. There they had a game together, and on their return played "Robber and Traveller" with the ones who had remained behind. This was the first *Turnfahrt* (excursion of gymnasts), and as the report of it spread so also did the desire to share in others of a similar sort.

Meanwhile the number who met from week to week had greatly increased. Undesirable elements doubtless were not lacking, but Jahn's genius for leadership soon made discipline and harmony prevail. He was quick to comprehend the characteristics of each boy, and winning the respect and love of them all he banished more and more the spirit of dissension which at the start was ready to break out on slight provocation. Besides the large number of occasional participants about twenty had come regularly twice a week for the afternoon exercises. Of these a part held together during the winter and were allowed a share in the indoor exercises practiced by the pupils of Plamann's School—fencing with light broadswords, and shooting at a target with the crossbow. This group formed a nucleus for the next year's work.

In the spring of 1811 Jahn went again to the *Hasenheide* with pupils from the *Graue Kloster* and Plamann's School. But now he had a more definite plan in mind. He wished to set up some gymnastic apparatus on a rectangular area opposite the public houses, where the gentle ascent from the valley of the Spree was marked by an opening in the woods. Work was begun on Wednesday and Saturday mornings immediately after school hours. First of all they enclosed the place with a fence of posts and fir branches, made an entrance gate, and built in the background a small hut or arbor where clothing could be left. Within the enclosure the simple apparatus, constructed of wood bought with the help of an old ship-builder, was set up. It comprised a balance-beam or mast suspended horizontally; a vertical rope hanging from a yard which was fastened in the limbs of two trees; triangle of horizontal bars made of three tolerably thick young fir trunks set seven feet above the ground and tied with ropes to three pines which stood at the angles; a roughly made ladder, whose rounds used to turn in dry weather; two climbing-masts, one fifteen and the other twenty or more feet high; two sets of fixed jumping-stands for high-jumping and pole-

vaulting; a jumping-ditch; a figure-of-eight track, one of the circles serving also as a wrestling place; and some sticks for hurling.

It had taken the whole month of May to complete these preparations. Meanwhile the games had gone on as usual, not within the enclosure, which was too small for such practices, but outside its limits, and especially on the *Rollberge*. The number of players had also been increased considerably. Jahn's friend Friedrich Lange, who taught at another school, the Friedrich Wilhelm and Werder *Gymnasium*, came accompanied by many of his pupils; and the boys of Schindler's Orphan Asylum were brought by two teachers. At last the work was finished and early in June the first *Turnplatz** was opened in the *Hasenheide*. On the 19th of the month there was a general gathering, at which each boy received a badge bearing the word "*Turnkunst*" and the numbers 9, 919, 1519, 1811.† Each Turner was assessed fourteen *groschen* (thirty-three cents) to meet the expense of keeping grounds and apparatus in condition; but boys of approved character and industry who were too poor to pay the sum were admitted free, and Jahn evidently advanced much of the original cost himself. In a short time the attendance increased to eighty or a hundred. The few who could be accommodated on the *Turnplatz* at one time exercised there, while the rest played "Robber and Traveller."

It was not long before the many trousers split across the knee, the shirts torn in wrestling, and the consequent complaints from mothers, revealed the need of a special suit for the exercises. Jahn therefore appeared one day clad in long trousers and a short jacket of gray unbleached linen, a costume so cheap and durable that its use soon became general on the *Turnplatz*, and an enemy of the Turners was in the habit of referring to them always as "the unbleached rascals." With the adoption of a uniform costume all distinctions of rank and class disappeared at once. Later

*Jahn in his opposition to everything foreign, had applied the verb *Turnen* to his exercises, believing it to be a term of German origin, or at least naturalized in Germany by long usage there. From its root he built up many new compounds which were now used for the first time—*Turner* (gymnast), *Turnkunst* (the art of gymnastics), *Turnplatz* (the grounds where the exercises were practiced), *Turntag* (gathering of gymnasts), etc.

†9—the date of Hermann's victory over the Roman legions in the Teutoburg forest; 919—the first tournaments held in Germany, or the accession of Henry I. to the imperial throne; 1519—the last of the tournaments, or the death of Maximilian I., the last knight on the German throne; 1811—the opening of the *Hasenheide Turnplatz*.

in the summer the numbers rose to 200. Undesirable persons were kept out, or put out whenever discovered. Bread and salt, or sometimes bread-and-butter and eggs, served to satisfy hunger, and pure spring water, forbidden to the over-heated, was the usual drink. All sweet stuffs were forbidden, as were also tobacco and brandy; for Jahn sought to excite in his young friends his own aversion to distilled liquors.

One of these first Turners has left an account of the exercises practiced at that period. Walking on the swaying small end of the balance-beam was considered a difficult feat, and in another exercise upon the same apparatus two pupils standing face to face with arms extended forward sought each to dislodge his opponent by light blows on hands, arms and shoulders. Spectators were astonished to see even the smaller boys climbing the rope to a height of 25 feet. Sitting astride the mast from which the rope was hung and hitching across it in that position was also tried successfully. On the triangle of bars the favorite exercises were traveling in hanging position, and arm flexions. They had not yet learned to swing up on to the bars. They climbed the inclined ladder on either side and then came down it hanging from below, or went up in that position also. One Turner made what was then the surprising height of seven or eight feet at pole-vaulting, and the greatest width reached at the ditches for broad-jumping was twelve feet. The figure-of-eight track was used at first for foot-races between two or three Turners, and later more for long distance running. Especial attention was again given to wrestling, an exercise at which Jahn himself was uncommonly skilful, even in his old age. There was as yet no vaulting horse; but one day Friedrich Friesen, a fellow-teacher with Jahn at Plamann's School and a young man of splendid physique, rare attainments and most winning personality, using the thick end of the balance-beam showed them how to vault to a seat from the rear and from the side.

Since it was the custom at the *Graue Kloster* to give up afternoon classes on Tuesday and Friday, in addition to the usual Wednesday and Saturday half holidays, during the months of July and August, and Friesen too was at leisure on Fridays, the exercises were continued on those afternoons. The gymnastics were not yet orderly or organized; but every boy was an inventor and shared the result of his labor with the rest, learning from them in turn. It was hardly in Jahn's nature to be systematic, and such a thing was foreign to his purpose. With him the happy

common life in the open air was the great essential, training the boys to work together in harmony and awakening in them a public spirit which might one day be of service to the nation. A dry school of gymnastics would not have attracted them, and to leave the individual to exercise by himself would have been no better; but in the common exercises, and especially in the games, he reached the whole mass at once in a way that suited him.

At last the fall came and put an end to work out-of-doors. Ladder, rope, jumping-stands and the sticks for hurling were stored away in a room rented from the overseer of the forest. But the winter was not allowed to pass without yielding something to the new movement. Jahn and the oldest of his pupils read eagerly whatever they could find on the subject of physical training, and studied with special care the books of Guts-Muths and Vieth.* At Friesen's suggestion and Jahn's expense four Turners, Dürre, Pischon, Molière and Zenker—the first of these replaced toward the close of the season by Ernst Eiselen—received lessons in vaulting from Benecke, fencing-master of the Cadet Corps, twice a week from January 11th, 1812, till the middle or end of the following spring.

The experience of the previous year had shown that the first *Turnplatz* was too small, too near the public houses, too exposed to "weather, wind and wit." Before the season closed Jahn had therefore selected a new spot farther to the east and south, on which the work of preparation was begun with the first spring sun of 1812. It lay on the wooded tableland which crowned the hill, close to the *Rollberge* and on the edge of heath and cultivated fields, and was protected from the wind on three sides by dense thickets of pine, fir and oak. Permission for the free use of the place was obtained from the authorities. Paths were constructed leading to the new site, the first steps toward leveling off and filling up inequalities of surface were taken, and trees set out along the paths and about the margin of the grounds. The fence and hut at the old *Turnplatz* were pulled down, and its apparatus was brought away. In the center of the new grounds another hut was erected, with a meeting and resting place near it, named by Jahn the *Tie*.

The equipment received numerous additions. There were jumping ditches as before, and three sets of jumping-stands, with holes bored in them at intervals of three or

*See this *Review*, Vol IV., No. 1, pp. 14-17.

four inches and iron pegs provided to hold the red cross-rope. Then came three "vaulting bucks" or horses without pommels, three, four and five feet high respectively, made from tree-trunks of different lengths and thicknesses. Close to these stood three pieces of apparatus, corresponding in height, intended for exercises preparatory to the vaulting. Each was made of two thin beams in the neighborhood of twelve feet long, set parallel with each other at a distance of about two feet. One of these beams Jahn wrote with a pencil "*Barren*," christening thus the first crude model of our parallel bars. The original aim in using them was merely to gain the strength of arm and hand necessary for lifting and supporting the body on the vaulting horse, *e. g.*, rising to the position of rest, and performing various exercises in rest. The great new balance-beam rested on a frame five feet above the ground, its tapering unsupported end projecting 32 feet beyond. Near the centre of the *Turnplatz* rose a 50-foot mast, and from the outer end of a cross-beam fastened to it five feet below the top a climbing-rope was suspended. There were also three climbing-poles, 16, 24 and 36 feet high. An invention of Jahn's called by him the *Dreibaum* (triple-tree) was set up not far from them. It consisted of a mast about 40 feet high braced by means of three oblique beams, with a yard extending far out on either side of it at a height of 30 feet for the attachment of more climbing-ropes. An oblique ladder rested against it also, and the three brace-beams were united with each other at a height of ten feet or less by horizontal poles, each of these further supported by two upright poles. During the summer six horizontal bars, at different heights, were set up between trees. Throwing with long iron-tipped sticks or wands were practised, at targets made of oak stumps which had movable iron-mounted heads. The regular running track was 150 paces long by 15 broad, and in addition there was a special three-ring track, with the wrestling place near it.

Jahn had already begun to note down and compile the various exercises, but invention was still lively, everything was in process of development and nothing settled. The first real horizontal bar exercise was swinging up to rest from the leaning hang on one knee, then the circle to rest from the ground, circles from riding seat, hanging by the knees, etc. On the parallel bars movements in rest position, changes of seat, swinging, upstarts, and front and rear vaults were practiced. These two pieces, the parallel bars and the horizontal bar, soon became the favorite apparatus of the

Turners, who vied with each other in devising new exercises upon them. But other apparatus was not neglected. One Turner climbed the long rope eight times in succession; not a few went up the ladder, hitched across the yard sitting astride it, and came down the rope, or they reversed the process; the climbing-poles were in daily use; the exercises of the previous year were continued on the balance-beam, and wrestling retained its attractions. Less interest was taken in jumping.

The Turners who had received lessons in vaulting from Benecke the winter preceding had met and with Friesen's help revised the work, replacing foreign words with German terms, and had developed thus a special school of vaulting. Three of them, Pischon, Zenker and Dürre, now practiced the exercises further at special hours with little groups of skilled companions. Friesen arranged to have a live horse brought to the *Turnplatz* on certain days, for lengthwise vaults and practice in coming to a seat from the side. Games did not hold such a prominent place as before, though "Knight and Citizen," and also "Black Man," "The Hunt," "Prisoners' Base," and storming on the *Rollberge* were still played.

During the summer the numbers increased to 500, new arrivals streaming in from all classes of society. On Sundays adults took part in the exercises. Friesen's other duties did not allow him to be present often, so that Jahn worked alone for the most part, assisted however by the older and more experienced Turners, whom he was now able to employ as squad leaders (*Vorturner*). If something new was to be practised he selected a few of the most skilful and taught it to them himself, and they in turn spread the exercises from group to group. It is expressly mentioned that in the two summers of 1811 and 1812 not one Turner met with bodily injury on the grounds. Excellent discipline prevailed as a rule; but occasionally there was a call for other than gentle measures. It is said that Jahn knew how to use a rope-end, and when two boys had quarreled he made them "root" each other in the presence of their comrades, *i. e.*, each was furnished with a pliant root and with these they fought it out in their thin linen breeches, striking with all their might in order not to appear cowardly.

Once a month Jahn used to stay all night on the *Turnplatz*, going through the exercises by moonlight in order to accustom his pupils to such changed conditions. It was also the custom for several Turners to keep watch there regularly, as a precaution

against theft. The *Turnfahrten* (excursions) were renewed, and gave a great impetus in independent excursions of all sorts. More than 100 Turners are said to have gone off on foot during the summer vacation, some of them on very considerable journeys.

The exercises met with some opposition, on the ground that they were many of them useless, or dangerous, or they unfitted the hands for delicate work, etc.; but in general the popular attitude toward the movement was very favorable. Spectators by the hundred and from all classes were often present around the sides of the *Turnplatz*, and the harmony that existed, the evident physical benefits and the strong national feeling which was cultivated were recognized and fully appreciated.

In the winter of 1812-1813 the most skilful of the Turners organized a society (*Turnkünstleverein*) which had for its object the critical study of gymnastics and the artistic arrangement of the gymnastic material. At Jahn's wish Friesen was placed at the head of it. A hall was also rented, a vaulting horse was purchased with 100 *Thaler* collected by some of the young men, and practice in vaulting and fencing was continued.

On the 17th of March, 1813, King Frederick William III. of Prussia declared war upon France, and appealed to his people to join in the great War of Liberation. Jahn was among the first to respond. He joined Lutzow's Volunteer Corps, where he remained through the war, and his example was quickly followed by most of the Turners who were old enough to bear arms. Before leaving Berlin he had entrusted the care of the *Turnplatz* to Lottery Director Bornemann, who had shown great interest in the work there. He also persuaded one of his earliest and most capable pupils, Ernst Eiselen, the state of whose health incapacitated him for military service, to undertake the direction of the exercises, introducing him to the city authorities and the head-masters of schools. Not much is known of the summer's work. About all that could be done was to hold together the little band that remained behind. Eiselen speaks of beginning lessons in vaulting and fencing on the 3rd of May, and Bornemann gave instruction in shooting in a little gallery which had been built. Jahn paid a visit to the grounds on July 28th, during the armistice.

Some citizens of Berlin, impatient at the delay in arming them with pikes, went out to the *Hasenheide* and there began to cut down whatever suited their purpose, in spite of protests, not sparing the trees that bordered the *Turnplatz*. Then they even broke into the *Turnplatz* itself and took away trees, beams, and

parts of apparatus, so that in the succeeding winter it was necessary to prepare new apparatus in part.

Work began again the next season (1814) on the 2nd of April, the Government allowing Bornemann the services of 105 French prisoners in order to repair the broken bounds and other damages at the *Turnplatz.* About 150 took part in the exercises at the opening of the year, but in July this number had increased to 339. Among the many visitors were the civil governor of Berlin, the president of police, the chief burgomaster, and a privy councillor. Later, in August, General Blücher paid a visit to the spot, and after watching some of the exercises made a brief address. The Crown Prince, who also appeared, was especially pleased with the wrestling. The wife of Prince William came with her children, and the sons of Prince Radziwill, the King's brother-in-law, were on intimate terms with the Turners. Thus *Turnen* continued in high favor with all grades of society.

On the 1st of August Jahn was again in Berlin, and on the 3rd he went to the *Turnplatz.* On the 30th of that month he was married at Neubrandenburg to Helena Johanna Amalia Kollhof, whom he had met during his residence in Mecklenburg as private tutor nearly ten years before. September 6th he returned to Berlin, whither his mother came to live with him after her husband's death. During the summer appeared Bornemann's "Manual of Gymnastics Revived by Fr. L. Jahn under the Name *Turnkunst,*"* intended to prepare the way for Jahn's own book which was published two years later.

Eiselen seems to have retained somewhat independent direction of the exercises, fencing and vaulting especially, even after Jahn's return. He mentions a society of adult Turners founded in the fall of 1814 to promote the development and spread of gymnastics, and to make singing general among the Turners, while they were at rest on the *Tie*, returning to their homes after the exercises, on excursions together, and on various public occasions. The society consisted originally of nine members who met every Saturday with Massmann, one of their number, to practice songs, discuss regulations, revise the exercises by series, fix rules for the games and choose leaders for the squads. Jahn was often present, and the decisions were laid before him for his sanction. The Turners, as might be expected, took an active part

*Lehrbuch der von Fr. L. Jahn unter dem Namen der Turnkunst wieder erweckten Gymnastik," 1814.

in celebrating the first anniversary of the Battle of Leipsic, October 18th and 19th. They kindled huge signal fires on the *Turnplatz* and joined in songs on the evening of the first day, and on the next closed the season with a great exhibition of selected exercises—jumping, vaulting, balancing, hanging and traveling in hang, climbing with feet and hands and with hands alone, wrestling, various sorts of running, etc. Among the spectators, estimated at 10,000, were delegates from six neighboring towns, the Crown Prince and others of the royal family, and many persons of distinction.

Late in the fall and winter the work of improving the grounds was carried forward, with Bornemann's active assistance. The patched and shaky framework of the *Dreibaum* (triple-tree) was replaced by a new one, simpler and better constructed; a building forty feet long was erected, to serve as a storehouse for apparatus and a place of refuge in case of storms; and a good 60-foot climbing-tower was put up. Jahn now wished to see his undertaking made a government affair and brought into closer union with the Berlin schools, and the work extended into the provinces. Minister von Schuckmann could provide no money for a building, which was another thing in Jahn's mind, or for the intended enlargement of the grounds, and he feared that too close control by the state would destroy the popular character of the exercises; but he proposed to increase to 800 *Thaler* the annual allowance (500 *Thaler*) which Jahn was already receiving, to provide Eiselen with a salary of 400 *Thaler*, and to make a yearly grant of 150 *Thaler* for the support of the institution, besides free timber for building purposes. To these recommendations Hardenberg, the Minister of State, agreed.

March 1st, 1815, Napoleon landed in France again; on the 20th he entered Paris; April 7th the King of Prussia issued a second call to his people, and the volunteers hastened back to the standards. Jahn, however, remained in Berlin to watch over the work at the *Turnplatz*, until he was summoned to Paris by Hardenberg in September. The numbers were again greatly reduced, but the exercises and the improvements in grounds and apparatus were continued. Among other things a *Vierbaum* (4 tree) was added. In the fall and winter that followed gymnastics was again made the subject of associated investigations, and now the results of so much study and experience were gradually brought together into a book. Eiselen undertook the technical portions with the help of Massmann, Dürre and others, while

Jahn wrote the general portions, decided in doubtful cases, and revised the whole. March 31, 1816, he signed the preface, and on the 29th of April the finished volume was published, under the title "Deutsche Turnkunst" (German Gymnastics).

(To be continued).

FLEXION OR BENT-KNEE MARCHING.*

BY E. H. BRADFORD, M.D.,
Boston.

An investigation of the best manner of walking, as an exercise for correct carriage or on the march, will interest the physician and the gymnastic teacher, but none more than those in charge of the training of soldiers, for rapid marching was never so important to the strategist and tactician as it is today. The Confederate general Forrest defined the science of war as "getting there first with the most men." It is for this reason that the subject has attracted much attention among military men.

Rapid movement is spoken of by an English writer† on the subject as of "prime importance in field manœuvres, and more

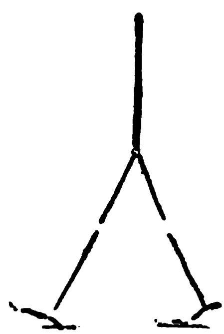

FIG. 1.—Diagram of erect gait at the moment of double support.

FIG. 2.—State militia officer marching in review. Drawn from a newspaper picture.

so today than ever; the time is gone by when heavy troops composed the main body of an army; the lesson of all recent campaigns is that great celerity of movement is indispensable."

In the last German manœuvres special attention was paid to rapid marching.

In the ordinary gait, as seen in pedestrians in our cities, the forward leg is advanced (the trunk being held erect) by the

*This article is republished and the cuts loaned through the courtesy of the New York Medical Journal, January 27th, 1900.

†Contemporary Review, March, 1899.

muscles of the front of the thigh and leg—viz., the psoas and the iliacus and the extensor cruris. After the foot is planted upon the ground firmly, another set of muscles by their contraction pulls the body forward. The heel, and later the front of the foot, but chiefly the heel, pressed upon the ground, are used for a pressure point to which the body is drawn. The muscles used for this are the glutæi and the hamstrings. The rear leg at the same time is used as a means of propelling the body forward by pushing, while the front leg is still in the air. The muscles that are brought into play for this push are the psoas and iliacus muscles, the hamstring, and the calf muscles.

The weight of the trunk and head is at the moment of double support equally divided between the points of contact of the two feet. When the individual habituated to this manner of walking wishes to increase his gait he does so by increased muscular effort, using a longer and more rapid stride, and this is the gait of active pedestrians in cities and the one to which soldiers have been hitherto trained.

It is not, however, that used by those obliged to economize their muscular strength in locomotion, as couriers and hunters. It is not the active gait of savages, or of children, or of those accustomed to walk habitually over uneven ground.

FIG. 3.—Straight-leg gait, civilian.

In the common gait in the evened paths of cities and towns the body is held erect. If, however, the trunk were inclined forward, it would of its own weight fall forward and thus be propelled in a measure without muscular action. This mode of locomotion —*i. e.*, falling forward—is actually employed in China by

penitents in a pilgrimage to a shrine, the body alternately falling forward at full length, rising to fall again (cycle of Cathay). This same force—viz., the weight of the trunk falling forward—can be utilized practically.

So long as the trunk is inclined out of equilibrium it will tend to fall forward. The action of the legs may be chiefly to keep the trunk from falling to the ground, but in fact they may also aid in driving the inclined trunk forward by pushing. The whole of the sole of the front foot is in contact with the ground, and furnishes a broader and firmer contact surface than is given by the heel of the projected foot in the erect gait. Straightening the leg at the knee is also instinctively avoided in active bent-knee gait, as it involves the muscular action necessary to raise the weight of the trunk—from a hundred to two hundred pounds. In a slow gait, however, straightening the leg affords relief to the thigh muscles, for the straightened leg sustains the weight of the superimposed trunk largely upon the bones and ligaments, while the bent leg needs the effort of the quadriceps muscles to sustain the superimposed weight.

In rapid flexion walking, with the constant shifting of the weight from one leg to another, this burden is lessened; but in a leisurely walk, with slow steps, the straightened leg and erect

FIG. 4.—Straight-leg marching. United States marines.

trunk, balanced at each step between the front and the rear foot, gives momentary muscular rest and lessens the labor involved in the raising of the trunk necessary to the straight-legged gait.

In a rapid and long-continued march the strength expended in raising the trunk two inches at each step can be readily estimated

as considerable. The front limb remains bent at the knee, as in this position the forefoot is at better advantage for the backward pressure of the limb employed in driving the trunk forward. The bent knee also furnishes less jar in checking the inclined trunk falling forward than if the leg was straight.

The erect or straight-leg gait is the gait of the dwellers of a city; it is the conventional gait, the gait of leisure, though it may become the rapid gait of the strong-legged. The inclined or bent-knee or flexion gait is the gait of rough country, of all who walk for a distance up to the limit of their strength, the gait of the strong-footed, requiring strength also in the muscles of the front of the thigh. It is the gait instinctively taken by boys when endeavoring to keep up with older and larger pedestrians who are walking rapidly.

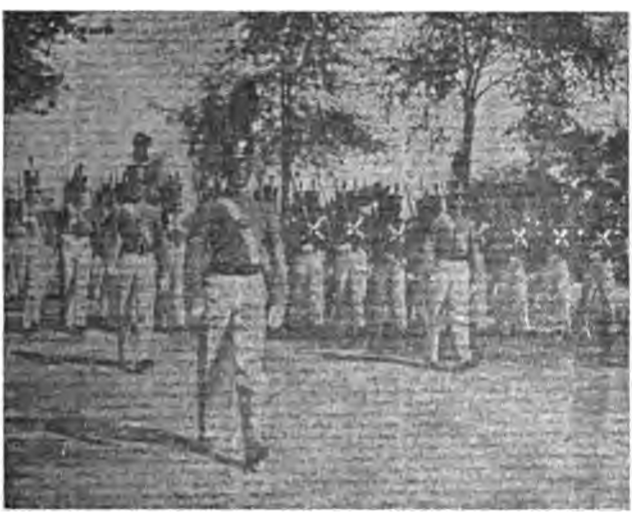

FIG. 5.—Straight-leg marching, West Point cadets.

This has been termed the flexion gait, from the most noticeable feature—that is, the bent rather than the straightened leg; but less noticeable, though no less if not more important, is the position of the trunk inclined forward from the line of equilibrium, thereby utilizing the force of gravity as a propelling force. If the trunk is held erect while the knees are kept bent the gait is both awkward and weak.

The gait is easily recognized, not only by the bent knee of the forward leg, the position of the head and shoulders well forward, nearly if not quite over the forward foot, but also by the lack of rise and fall of the trunk in the walk, and by the fact that the feet are kept nearly straight and not turned out, as happens if the thighs are well advanced in the erect gait by the psoas and iliacus muscles, which, inserted on the lesser trochanter, tend to rotate the limb outward.

It is evident that there are many gradations between these two well-marked types of locomotion, as well as individual peculiarities, and variations also in the rate of speed; but the rate of speed which can be acquired by the average man in the bent-knee is much greater than that attained by the straight-leg gait.

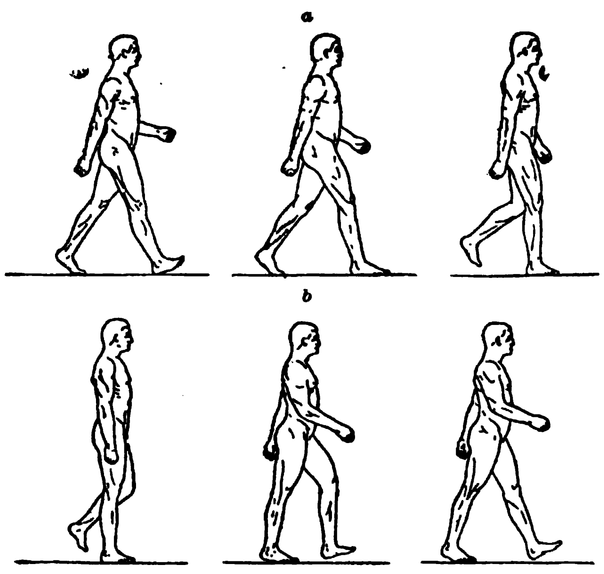

FIG. 6.

It is evident that the gait should be adapted to the purpose required. The individual on the floor of a ball-room, with footwear which binds the foot to a conventionalized shape, makes use of a different step from that required in cross-country walking. The marching step is practically that required by individuals walking constantly over ground of irregular surface, as rapidly as is compatible with the capacity of the weaker members of the command, and the pedestrian in long walks should employ that in which his muscular force is used to best advantage.

The parade step may be left out of consideration in this inquiry. It will necessarily be more or less a matter of convention, dependent, as it is, upon military fashion, the views of the sovereign, the commanding officer, or the community before whom parades are made, and will vary from Berlin to New York. The attempt to train soldiers in the straight-leg gait to strike the ground first with the sole and not the heel of the extended leg, the "parade shritt" of the Germans, is an example of this. The step requires training, indicates drill, but is not a useful one.

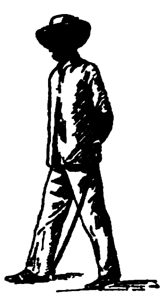

FIG. 7.—Spanish officer. Drawn from a newspaper picture.

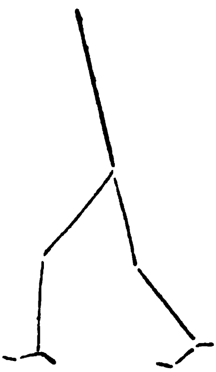

FIG. 8.—Flexion, inclined, or bent-knee gait.

The question as to length of stride and cadence is also a question of drill. These vary with the height and strength of the individual and are learned instinctively in practice.*

To quote from a writer in the New York Sun, May, 1899: "Men who served in the last war," said a member of the National Guard, "soon learned that the armory step was of little use in the field. The one was all right enough in its place, and even in the streets of New York; but in the field, where men want to keep their strength as much as possible, they soon learned that a bent knee and toes straight ahead were better than the stiff leg and toes out. The 'get-there' step is what we call it . . . The

*The length of the ordinary step in the United States army is thirty inches, measuring from heel to heel, and the cadence is at the rate of a hundred and twenty steps a minute. This was fomerly ninety steps of twenty-eight inches to the minute. The length of the full step in double time is thirty-six inches, and the cadence is at the rate of a hundred and eighty steps a minute.

The stride of the German soldier is thirty-one and a half inches, with a cadence of a hundred and twelve steps a minute. The French soldier has a stride two inches shorter, and a cadence of a hundred and fifteen steps a minute.

high-stepping soldier is as little suited for long marches as the high-stepping horse for a race. To march effectively is one thing, 'to look pretty' another."

"The upright posture is admired and taught to the soldier, but it is the one that demands the greatest expenditure of physical energy, and is the worst adapted for prolonged effort."

Where the ground is soft and the muscles of the soles of the feet are strong, the front of the foot, including the toes, can by muscular contraction of the sole muscles and of the flexor muscles of the toes exert a greater pressure upon the ground, and serve as a means in driving the body forward. Strong-footed individuals with moccasins or bare feet actually claw the ground in strong action in a manner analogous to the gait of bears or monkeys. This will be seen in strong-footed individuals walking up an incline or upon slippery ground. Where the flexion gait is carried

FIG. 9.—Flexion gait, west coast of Africa. Drawn from a photograph.

FIG. 10.—Inclined gait in child, west coast of Africa. Drawn from a photograph.

out largely to the exclusion of the use of the rear foot in pushing, the muscles of the feet will be developed to a greater extent than the muscles of the calves of the legs, and this is commonly seen in barefooted savage races.*

A valuable consideration of this subject was made a few years ago by French military writers, who developed and have advocated the flexion method of marching described, after studying the couriers of Algiers.

*In the front foot of the Greek statue of the Discobolus the strong contraction of flexible toes to secure a hold upon the ground is well depicted. This can also be noticed in the wear of moccasins.

This gait, although in rapidity at times resembling a run, differs from a run, as both of the feet are never lifted off the ground at the same time. It does not tax the strength and circulation to the same degree as a run. The gait is analogous to what has been developed in individuals of all sandal-wearing or barefooted nations, who, as hunters and couriers, are obliged to cover long distances rapidly,† and is analogous to what has been termed the inclined or bent-knee gait.

French writers give the following description of the leg movements of this gait: "The knees must be always bent; the feet lifted no higher than necessary to clear the inequalities of the ground; the advancing foot must be placed flat on the ground, the step being made neither by the toe nor by the heel. The

FIG. 11.—Flexion gait, Cuban volunteers.

footfall should be noiseless, and the steps at first short and frequent. The body must lean well forward, the back must be straight and the head erect, the chest open and shoulders low."‡

Dynamometric experiments are said to have shown that the foot does not press so heavily on the ground as in the ordinary style of marching, and so, it is suggested, the man has more strength left to expend in propulsion; moreover, there is less of a jar at each step, and in place of the customary tramp of armed men, the tread is comparatively noiseless.§

It is clear that this gait, which is to be employed where rapid movement is required, will be best used by people with strong

† New York Nation, July 23, 1896, p. 68, and August 13, 1896, p. 122.

‡ Army and Navy Journal, September 9, 1899.

§ New York Medical Journal, September 23, 1899, p. 454.

and flexible feet and feet unimpeded by constricting shoe wear.* This is substantiated by historical facts. Morgan's Rangers in the Revolutionary War with their moccasined feet were able to show a surprising amount of marching activity, and in the Italian campaign in Abyssinia Menelik's strong-footed troops showed activity to great advantage as compared with the Italian soldiers. An extraordinary march was made in 1885 in Peru by the troops under General Caceres along the Cordilleras to Chicla, which, according to reports, outclassed all records of forced marches by trained European soldiers.

From facts such as these it appears that in training for marching we have still much to learn from the moccasined and semi-civilized nations. It will be suggested that as savages are habituated from early youth to an activity of foot it is impossible that their record can be approached by civilized nations. This argument, however, is hardly convincing, as it has been proved that in all athletic contests civilized man, after training, is superior to a savage. If the proper methods of training are used equally good results can be obtained. The civilized soldier should certainly

FIG. 12.—Flexion gait, negro chain gang.

*Prof. Shaler, of Harvard University, who has frequently tramped with North American Indians, tells me that a gait employed by them consists in lengthening the stride by throwing the pelvis forward. This is used occasionally in track walking matches and in short-legged walkers in an attempt to keep pace with longer-legged competitors, but can not be utilized in long-distance marching.

not be hampered, however, by imperfect shoewear, and by an imperfect system of training, which develops wrong muscles.

The method of physical development for the purpose is not difficult, as has been shown by French experience, and consists simply in training in what is termed "flexion" marching with proper shoes. The same can be accomplished in this country if similar measures are adopted.

"In France two officers, two sergeants, and thirty men of a regiment were put under training at Nantes, and it is reported that 'after three months' instruction, they marched, in the presence of General Fay, carrying their rifles, bayonets, one hundred rounds of ammunition per man, and food for one meal, along a

FIG. 13.—Flexion marching, sailors from the *Olympia*.

hilly road, a distance of twelve miles and a half in an hour and forty-six minutes, which is at the rate of rather over seven miles an hour. Not one man fell out by the way. After a rest of two hours, they returned in three hours and five minutes, including two halts of ten minutes each, which gives an average speed of over four miles and a half an hour. Two days afterward these same men, in the presence of General Colonieu, in heavy marching order, covered a distance of six miles and seven eighths across fields, on hilly ground, in an hour and twenty minutes, which works out at about five miles and a half an hour. At the end of their march they were at once told off to target practice, when their shooting proved superior to that of the best company of marksmen in the regiment; this was done to determine whether the exertions of their rapid march had injured their capabilities as riflemen."

The English writer in the Contemporary Review, 1899, shows that by proper training "speed" may be acquired, and relates that a body of English reserve artillerymen, who were no longer young, after a course of eighteen lessons, marched five miles in forty-six minutes with their arms only, and two miles and a half in twenty-six minutes with full equipment.

The lessons, according to the French authorities,* need not be more frequent than two or three a week. A table is given of the distance to be traversed in each of the thirty-six lessons, beginning

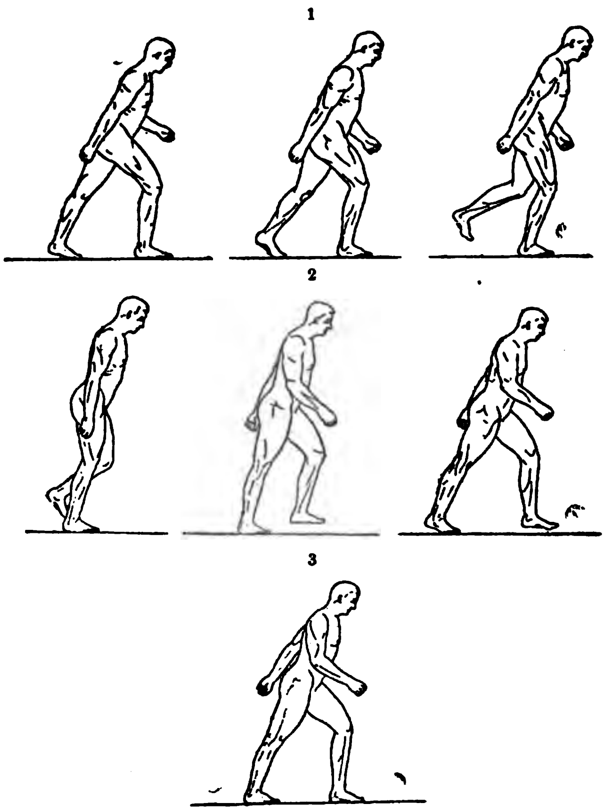

FIG. 14.

with three thousand yards and going up to twelve thousand; also showing how in the early lessons ten minutes is allowed for the first kilometre, nine and a half for the second, and seven and three quarters for the third; these times steadily diminish with

*Loc. cit.

each lesson, as the pace increases, until finally the first kilometre, or five eighths of a mile, is traveled in seven minutes and three quarters, the second in six and a quarter, and the third in five and three quarters. Now, one kilometre in five minutes and three quarters is a good six and a half miles an hour. It is added that a three -months' drill is necessary to thorough training in the "flexion" march.

To enable, therefore, the individual to attain to considerable speed without fatigue, it is only necessary to develop certain powerful muscles not brought into action to a great extent in ordinary civic walking, and this from the evidence presented would appear to be easily possible.

Anv one attempting this "flexion" or "bent-knee" gait will after a little practice be convinced of its value as well as of the obstacle to its adoption. The latter can be stated to be simply that it is not a gait which is in accordance with the accepted idea of marching or graceful walking.

A knowledge of the principles above mentioned is also of value to all interested in walking as an exercise, and in this connection the origin and development of the erect gait are of interest. In roadless communities the feet and legs of the pedestrians are exercised in accordance with the muscular needs in locomotion on uneven ground, which by its inequality brings into play all the muscles that are used in walking. The shoewear is either loose or the individual is barefooted, and the foot is not cramped; but in cities or towns where the footpath is even, and a leisurely gait is favored, the trunk is held erect and the rear leg, when advanced, is swung forward like a pendulum, striking the ground well in front of the axis of the trunk. This gait becomes the habitual gait, and is an easy one. Walking is deprived of its difficulties through removal of obstructions and the even surface on which the individual walks. The individual is able to wear boots of a conventional shape which constrict and weaken the front of the foot without interfering with locomotion and without materially interfering with the gait. After the individual has become habituated to this gait, and the muscles necessary for this form of walking are developed, it becomes the customary means of pedestrianism, and where speed is required, or exercise is needed, the same form of gait is used, a gait which, however, demands an unnecessary expenditure of muscular force.

The flexion gait may be regarded as a natural gait, and should be acquired and practiced by all pedestrians, among whom walk-

ing is of service, either as a means of healthy exercise or as a necessity.

The subject is one well understood in the War Department, and is in practical use in the regular service, but it is desirable that those in charge of our State militia organization should consider it. Instruction and drill in marching with proper footwear, with contests between different organizations, could be introduced as rifle practice has been, and would be beneficial both to strength and to the efficiency of volunteer troops.*

Richard H. Dana, the author of "Two Years before the Mast," an accurate observer, and except in early life accustomed to meet chiefly those habituated to urban or erect gait, graphically, through unconsciously, described the "forward gait" of General Grant, when the latter first came to Washington fresh from hard campaigning and years of frontier life. In connection with the commander's lack of military bearing he writes, "He does not march, nor quite walk—he pitches forward."

General Grant may stand for the great examplar of modern war, which disregards convention, but utilizes all forces in accomplishing the desired end.† A careful economy of all strength is as useful in peace as in war, and is desirable in our sports as in our work. It should not be overlooked in the healthy exercise of pedestrianism.

*In this connection the recent performance of a seven-year-old barefooted boy in Missouri deserves notice. He is reported to have walked twenty miles in four hours and a half (*Boston Globe*, Friday, October 6, 1899), without fatigue, affording an illustration of the fact that the rising generation has native qualities which our civilization should not check.

†Rhodes. *History of the United States*, vol. iv, p. 439.

ANTHROPOMETRIC STUDIES IN NEBRASKA.*

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The problem of the age is life, development, conservation of energy.

That which has absorbed the maximum of our attention as educators, is intellectual development; the result passes for education. The more advanced method by which this much coveted end is being hastened today is by the conservation of energy, by the study of economy in the use of the student's time, by teaching him only those things for which he finds an application, by making his path easy. It is not entirely clear but that for the development of individuality of students, too much thinking is done for them. The saving salt to their originality is the inculcation of this practical utilitarian point of view. But the latter has not seemed adequate for the desired end. The independent thinking of a few decades ago, which almost single handed forged its way through all difficulties is responsible for the independent vigorous minds of today.

Economy of expenditure means conservation of energy, but the latter does not necessarily mean true development. A man may by skillful manipulation of his affairs avoid bankruptcy, and yet be gasping for life in a business way. A man may by attention to diet, sleep and other physical habits prolong his existence indefinitely, and all the time be tottering upon the brink of the grave, but this is not *living*. Economy is good, expenditure is better. The vigorous use of his faculties makes the man. That education which does not include the cultivation of vigorous, healthy, normal thinking, is no education. The law of the universe that each form of life prepares the way for something higher, culminates in man himself. The physical exists for the mental, the mental for the spiritual. Brain requires to be fed with rich red blood, the spiritual life demands a clearness of vision to see God.

*Address delivered before the Physical Education Section of the National Education Association, Los Angeles, Cal., July 12, 1899.

Whenever a man ceases to be dependent upon a brain to do his thinking, then will energetic thought cease to be dependent upon physical energy. The teacher who attempts the development of the life of an individual without measuring his physical vitality, is as wise as the builder who attempts to bridge the Niagara without a knowledge of the strength of materials.

The period at which in a peculiar sense rich full life is made, is that of childhood when public school teachers have the responsibility. It is the period of ceaseless activity, of inquisitiveness and acquisitiveness, of latent power, of growth and development. The ultimatum of our endeavor is not head cramming with book learning, but the formation of character. In the final analysis force of character depends upon the sustaining power of a strong physique. There are no doubt many practical and historical exceptions, but health of mind and clearness of mental vision are not the natural products of a diseased body or of weakness and atrophy, any more than a morbid diseased imagination, a weak memory and a variable judgment are the fruit of a healthy organism. The severe concentration of our modern thinking is making "little old men and women" of our boys and girls, is sapping vitality during the period in which it should be stored. The thoughtful teacher is beginning to recognize that health and development, not book learning are his first care; that individuals not things are to be taught; that thinking not knowledge is power. He wants a working basis for the production of physical and intellectual power.

The first thing to know is whether and how much a child varies from the normal of his sex and age, then what kind of exercise will correct his peculiar defects. Upon the collection of a large number of physical measurements very accurate standards of normal development may be obtained. According to the generalizing method the mean development of each sex and age is regarded as the type or norm for that sex and age. The probable deviation indicates the extreme amount which a given child may with safety depart from normal development and still be advanced to a higher school grade.

In Lincoln during May, '98, two weeks were spent in taking measurements at ten schools. Twenty-five University students and instructors volunteered to assist in the work. Efficient aid was rendered by teachers and principals, and the heartiest co-operation and practical interest was exercised by the City Superintendent, Mr. J. F. Saylor. More than 2500 children

were examined. Fifteen different physical qualities were taken by observers, the same number of accessory items as to nationality, occupation, hereditary diseases, etc., were elicited by question blanks sent to parents. With the aid of assistants, several weeks were spent in the calculation of results from these measurements. Up to the present time the conclusions reached for Lincoln are:—

1. Girls are heavier and taller than boys during the thirteenth and fourteenth years. During the twelfth and fifteenth years also they exceed boys in height but not in weight.

2. The physical basis of mental efficiency was indicated, though not as accurately as in the results obtained by Dr. Porter from St. Louis schools, because the number of children near the extremes was not sufficiently large to permit the calculation of an exact mean.

3. Children of the ages nine, ten, eleven and twelve were classified according to nationality of parents. With but one exception American children were taller than those of foreign extraction. American girls twelve years of age were slightly shorter (2 Millimeters). American boys with the exception of those eleven years of age were heavier than boys of foreign parentage. American born children excel in chest expansion for almost every age.

4. According to Comparative Table I (to be found in the Proceedings of the Nebraska Academy of Sciences, Nov., '98), the statures of children of nine, ten, eleven and twelve years from various localities arrange themselves in the following order:—

Belgian children (Quetelet) lowest.
English children (Roberts) second.
St. Louis children (Porter) third.
Omaha children (Hastings) fourth.
Lincoln (Hastings) fifth.
Boston children (Bowditch) last.

and superior in height to all the rest, although Lincoln children are very close to them in development. This fact of superior stature of Nebraskans has been forced upon my attention in the examination of students in the University; they are superior to Amherst, Yale and Cornell men.

According to Comparative Table II (Proceedings of the Nebraska Academy of Sciences, Nov., '98) the same general

order is preserved except that English children in weight or general solidity of muscle and frame take sixth, or highest place. Lincoln children rank at third place, the order being Belgium first, Omaha second, Lincoln third, St. Louis fourth, Boston fifth and England last. However the ultimate development of Boston boys is superior to that of the English boys, as the mean development for the years twelve to sixteen shows.

The type or norm of Lincoln children of each age and sex has been calculated for the following qualities:—weight, height standing, height sitting, breadth of chest, depth of chest, lung capacity and chest expansion. They are prevailingly larger than St. Louis children of the same age and sex.

Upon the organization of a local Physical Education Society this spring, Omaha perfected its arrangements for the examination of public school children. Under the able and immediate direction of Supt. C. G. Pearse ten thousand children were examined during four weeks ending the second week in June. This examination proceeded along the lines already adopted at Lincoln.

The type of Omaha children has been calculated for weight, height standing and chest expansion. They are slightly inferior to Lincoln children, and because of the deteriorating influence of city life, probably inferior to the type for the State of Nebraska.

A few points of difference are worthy of remark. Omaha children rank at fourth place as to height and at second place as to weight, being superior to St. Louis children as to the former quality and inferior as to the latter.

By the results obtained in Omaha the physical basis of mental efficiency is satisfactorily demonstrated and the conclusions of Dr. Porter sustained. Children of the same age and sex increase in mental efficiency according to the development of their various physical qualities, height, weight, etc. Time has not sufficed for the calculation of other qualities but the rule is sustained as to height and weight with but few exceptions, as indicated by the accompanying tables.

Height Standing, — Boys.

Age	No. of Observations and Unit of Measure	I Grade	II Grade	III Grade	IV Grade	V Grade	VI Grade
	No. of Observations	137	245	83	8		
Eight	Centimeters	119.88	120.67	124.88	126.75 (?)		
	No. of Observations	17	119	145	83		
Nine	Centimeters	125.75(?)	125.67	126.40	127.62		
	No. of Observations		50	151	194	67	
Ten	Centimeters		129.00	130.27	131.45	134.80	
	No. of Observations		29	90	187	176	59
Eleven	Centimeters		131.12	131.70	134.07	137.06	137.50

Height Standing, -- Girls.

Age	No. of Observations and Unit of Measure	I Grade	II Grade	III Grade	IV Grade	V Grade	VI Grade
	No. of Observations	95	232	79			
Eight	Centimeters	118.00	123.16	125.12			
	No. of Observations						
*Nine	Centimeters						
	No. of Observations		31	108	203	72	
Ten	Centimeters		128.75	129.11	131.71	132.92	
	No of Observations			53	145	134	58
Eleven	Centimeters			132.25	134.22	135.83	137.50

* Not yet calculated.

Weight, — Boys.

Age	No. of Observations and Unit of Measure	I Grade	II Grade	III Grade	IV Grade	V Grade	VI Grade
	No. of Observations	137	245	83			
Eight	Pounds	48.62	51.26	53.80			
	No. of Observations	17	119	145	83		
Nine	Pounds	55.10(?)	54.75	55.50	58.15		
	No. of Observations		50	151	194	67	
Ten	Pounds		57.25	59.60	60.30	62.86	
	No. of Observations		29	90	187	176	59
Eleven	Pounds		61.00	62.60	64.90	67.10	67.00

Weight, — Girls.

Age	No. of Observations and Unit of Measure	I Grade	II Grade	III Grade	IV Grade	V Grade	VI Grade
	No. of Observations	95	232	79			
Eight	Pounds	46.76	49.29	52.22			
	No. of Observations	11	78	121	47		
Nine	Pounds	52.00(?)	51.60	55.22	56.88		
	No. of Observations		31	108	203	72	
Ten	Pounds		57.58	58.62	59.42	62.00	
	No. of Observations			53	145	134	58
Eleven	Pounds			63.80	62.56	66.00	68.56

Girls eleven years of age in the third grade are heavier than those in the fourth grade. This appears to be a distinct variation from the rule. Boys eleven years of age in the sixth grade are slightly (1-10 of a pound) lighter than those in the fifth grade of the same age, but this is of no special moment. The remaining exceptions are easily explained. Of boys nine years old seventeen who are found in the first grade average a small fraction larger than those of the second grade for both height and weight. Of girls nine years old eleven found in the first grade average slightly larger than those in the second. No stress can be laid upon these exceptions since the number in each case is too small to warrant the calculation of an accurate mean.

And not only is it true that children of better physique are more advanced in school grades, but as a rule the percentage of their class standing increases with the advance in school grades, e.g. the percentage for boys of nine years averaged by grades are I 82 per cent, II 83 per cent, III 84 per cent and IV 89 per cent. This rule holds as far as the calculation of results has been made, viz., for children eight, nine and ten years of age. Wherever there is an occasional falling off in percentage, it occurs usually in the highest grades for the age, especially in the fourth grade. From this uniformity in the nature of the exceptions the general inference may be drawn that the children in the highest grades were pushed into them too rapidly. An added reason for the falling off of percentages in the fourth grade in Omaha schools may be that the children are given an entirely different line of subject matter as they enter this grade. It is worthy of note, also, that the children now in the fourth grade in Omaha are the first kindergarten-trained children to enter the fourth grade. In response to an inquiry with reference to this matter Dr. Towne of Omaha pointed out that possibly for this reason they are less mature, or in his words, "Their childhood has been prolonged."

Omaha girls surpass the boys in weight during the twelfth, thirteenth, fourteenth and fifteenth years, in height during the ninth, tenth, eleventh, twelfth, thirteenth and fourteenth years. The superiority of girls during the ninth, tenth and eleventh years, however, is not very marked.

What bearing these results may have upon the theory of prepubertal acceleration of growth may not be acccurately determined, until some more exact observations as to the age of puberty for Nebraska girls shall be determined, but there is

nothing in these results contradictory to the observations of Drs. Bowditch and Porter. The climate of Nebraska is said to induce nervousness. This tends to decrease weight. Perhaps the nervousness of the climate affects the weight of growing boys more than that of girls; but whatever the disturbing cause, the results from Omaha for the most part sustain the previous conclusions as to prepubertal acceleration of growth first pointed out by Dr. Bowditch.

In support of the statement that Nebraska is a nervous climate, it may be interesting to note that the normal pulse rate for the young men of the state, as based upon six hundred observations in the University was found to be eighty and a small fraction. This calculation is sustained by the observations of several Lincoln physicians, one of them examiner for a life insurance company. This rate is eight to ten beats higher than the normal for the East. The pulse rate of Nebraska football men in '98 was 76.75, of the track men 80.5, while the rate for athletic men in the East is said to be about 60.

The altitude of Nebraska ranges from 1000 feet to 2000 feet over the populous region. Apparently, therefore, this nervousness of climate cannot be accounted for primarily upon the ground of altitude. The pulse rate is found to be higher the farther west observations are made. Electric storms prevail over the barren wastes of the Northwestern portion of the state. Nervousness of climate for the state appears to be induced by dry electric storms combined with high winds, and the degree of nervousness to be diminished with the distance from the centre of electrical disturbances. At certain times of the year such storms in the Mojave Desert are said by resident physicians to produce similar nervous conditions in Pasadena and other California points within the zone of their influence.

In chest expansion, Nebraska children are prevailingly larger than St. Louis children. In Lincoln some remarkable cases of chest expansion were discovered. One boy of fifteen years in the Bancroft School measured 5 7-8 inches of expansion, which is more than any man in the University of Nebraska possessed. Only one man boasts an expansion of five inches, and that not mainly because of his size but rather from great flexibility of the thorax. Several boys in the Bancroft School had three inches or over of chest expansion coupled with a prevailingly large lung capacity. Out of six of our largest and strongest men in the University, ranging from 5 ft. 10 in. to 6 ft. 6 in.

and with a lung capacity of 345 cubic inches to 415 cubic inches, the largest chest expansion was between six and seven centimeters, or less than three inches.

In Omaha also there were several cases of very remarkable chest expansion. Upon the authority of Dr. Towne who measured almost the whole ten thousand children as to this physical quality, I am able to state that there were a few cases in Omaha ranging from twelve to fifteen centimeters. Among children of a median age these cases of remarkable expansion are most frequent. All these observations appear to indicate that adults, especially large-boned individuals, usually have little flexibility of the thorax, and they point to a period during adolescence when flexibility is greater than in later life.

The smaller weight, broader thorax and greater lung capacity of Nebraska University students, men and women, the superior height of the men of the state as well as some minor differences in development point to a distinct departure from the Eastern student type. The fact that these observations for adults agree in the main with those already made for Nebraska children indicates that the trend of development toward a certain fixed type is constant for the state during the whole period of growth.

Every state ought to be thoroughly organized for the promotion of an adequate interest in the physique of its student population, from the kindergarten to the University. Physical facts need restatement in a terse concrete form to teachers and pupils. There is sufficient general realization of the value of exercise for the promotion of health, but there is no definite, practical and prevailing system of bringing about a reform.

Our sympathy with the correction of physical abuses is lost sight of in the intellectual work which has absorbed our lives. We give time now in our daily instruction to the same subjects which occupied us in University, college or normal school, and proportion the time between various subjects and exercise for our pupils practically as our instructors divided them for us. Life seems to us too short for attention to the earthly tenement in which we live, time must be more profitably employed in the development of the higher nature. Time must be given to the superstructure of the edifice; let the foundation take care of itself.

The supporters of physical training are largely those who have learned by a bitter experience in college or out in life that it takes vitality to do a man's work in the world. If you will

notice, a large percentage of the leading physical educators of the day were driven into the work by their own physical need. In giving attention to the development of their own physique, they have obtained an interest and a bent of purpose which has directed the effort of their lives to the labor of prevention of the physical evils to which they themselves have fallen a prey. They who have always been whole do not feel the need of a physician, but they who have *become* whole feel like becoming physicians to those who are sick. However, the masses of people who do not understand the meaning of weakness, atrophy and low vitality are just as sympathetic with physical education reform as they know how to be. They understand that physical evils exist and that in the abstract there is some remedy for them, but it rarely occurs to them that the state ought to apply the remedy. These people can be aroused to a live interest only by the presentation of concrete facts from their own immediate surroundings. Given this vital interest and the whole matter of physical education solves itself. The need of gymnasia, physical instructors, time for exercise, character of exercise, etc., will be met. Nothing excites interest like local facts.

The best thing then to stir up an interest throughout a state is to examine the children of the state. The result of this investigation will be an interest aroused in students, parents, teachers and school boards.

Children learn that they have a body to be developed, become intelligently interested in care of health. Parents are reminded that the strength of their children is their immediate and most vital care.

Teachers understand that their pupils are not alike in physical capacity, that some must be pushed and some retarded, or rather their interest diverted into physical development for their own ultimate good. They learn that to push the child out of one grade into another is not the ultimate end of good service; that certain children who appear dull and lifeless at times are so from pathological reasons rather than psychological; that such children are not stubborn, but physically abnormal. A vast amount of friction between teacher and pupil which now passes under the name of a necessary evil might be avoided by the teacher's understanding more of physiological psychology and the laws of growth and development.

Finally, the school boards who are prevailed upon to undertake such an investigation are interested individually and col-

lectively by that which they are undertaking through delegated power and never fail to show their interest by the presence and active assistance of some of their number.

The second thing to do is to bring conclusions into suitable shape for presentation before the state medical association, the academy of sciences, or other scientific bodies; before the state teachers' association; before school boards of the cities interested; and to present them also to the teachers and to the pupils of the schools who furnished the data.

The third thing to do is to get some systematic physical training into the schools and with it a system of annual physical examination, simple at first but becoming more and more thorough as the services of able medical men become available for examinations and prescription of exercise. Then we shall have provided for our own flesh and blood as carefully as we have for the young criminals of the country in Reform Schools and have given them an equal chance of becoming strong, able-bodied citizens.

The best method of securing the co-operation necessary to the carrying out of such an investigation of the growth and development of children is through the organization of a local Physical Education Society. Co-operation means strength. Bring into this society the state, county and city superintendents, principals of high and grammar schools, teachers, members of the school board, leading physicians, physical directors of colleges and universities and other professors, German Turners, Y. M. C. A. and Y. W. C. A. physical directors, and all others interested in physical work. It is not difficult to interest these people for you have something practical and tangible with which to do it.

From among all these different sources you will be able to find assistants for the examinations, advice in the execution of all technical matters medical or mathematical, the scientific ability for the presentation of results before representative people; and upon the superintendents of city schools you can rely for the energy and executive ability to make the investigation go from start to finish. At least this has been peculiarly true of Nebraska city-superintendents. By the use of teachers as assistants in minor measurements and as recorders, a very few regular skilled observers may accomplish a large amount of work in a few days. Older children may be used as recorders, but this was not found absolutely satisfactory.

The matter of measurement of children is very much more

expeditious than is the calculation of results. Ten afternoons of from two to three hours each were necessary for the measurement of 2500 in Lincoln schools, with two sets of instruments, taking two rooms at a time. With one set of instruments and corps of observers, 10,000 were examined in Omaha within four weeks. With the proper organization of forces, these measurements can be taken accurately at the rate of two and even three children each minute. In Lincoln over 300 children were measured through two sets of instruments working in separate rooms within two hours. Our method has some points of superiority over that of Dr. Porter in that schools are not interrupted from regular class work but one day or part of a day. Any school however large can, with proper management, be finished in one day. It must be remembered, however, that no examination of sight and hearing was attempted in Lincoln or Omaha. We have preserved these most important items for another year expecting to be able to command by that time the services of expert examiners.

It is not supposed that the figures given herewith are final for Nebraska. It is not claimed that they will not be changed slightly by future examinations, even if the physical type of Nebraska children in the meantime fails to change appreciably through the introduction of physical education into our schools. But they are correct within a millimeter or so as to bone lengths and girths, and within a fraction of a pound as to weight.

The purpose of this first general examination is to provide an approximate standard of the normal development for each age and sex. Nebraska will have a full series of anthropometric tables for use in schools as soon as the calculations can be completed, probably before the end of this year.

After physical examinations have been introduced for a period of several years throughout the state and 100,000 or more individuals have been examined from various cities and schools, it will be time to anticipate obtaining conclusions of more absolute accuracy. Until such a time we may be content to use charts based upon the first examination of the children of our own section or else procure them from some state where the physical conditions are practically the same as in our own state.

Although I believe that the use of charts based upon the measurements of Dr. Porter in St. Louis or upon the measurements in Nebraska would be as satisfactory for the graphical indication of the development of children in the West as are the charts of Sargent, Hitchcock and Seaver for university students, yet I be-

lieve that it will usually be found practicable as well as most productive of a rapid growth of interest and of permanent results for a state to enter upon this investigation first, and to provide for itself the standards of symmetry by which children of the state are to be estimated. Few cities, counties or states are already so thoroughly aroused to the need of the prevention of disease and of the promotion of growth and development of children that they are ready to inaugurate outright a well developed system of physical examination and of physical training. They need some preliminary steps of encouragement to action. It has been the aim of this paper simply to offer these preliminary steps. This plan of local investigation of need never yet failed to arouse an ever increasing increment of interest in all who came in touch with it. Through the individual work of Drs. Bowditch, Porter and others who have labored upon these problems, made their contributions to the subject and passed on perhaps, to others, we have been deeply benefited; but it appears to me that the greatest good in a practical way is yet to be obtained from this method of investigation through the awakening of the public interest and of the public pocketbook for the development of health and vitality in our American school children.

Additional scientific results of permanent value to anthropologists will accrue from such widespread investigation among the states and will form a sounder basis for future work; and the young medics who are now kicking up their heels in offices all over the country waiting to find or to make patients, can secure more profitable occupation in practicing the prevention of disease as medical examiners and physical directors in our public schools. The trend of modern medicine theoretically is to preventive medicine; why not make it practical by putting it into force during the time of life when the whole organism is plastic and complete development is possible. By exercise properly directed more can be done for the future physical strength of the man in one year of training before the university age, than in two or three after his entrance upon academic study.

Besides, the development which is obtained later in life is not so permanent. Men often work up strong arms or legs or some other part of the body which has been weak by the use of gymnastics while in college, but after they get out into business or professional life and drop this form of exercise they are surprised to find that the development upon which they were wont to pride

themselves has gone with the cessation of the exercise; not so with the brawn of the country bred boy, or with the gymnasium bred city youth, at least not as noticeably so, although lack of exercise does tend to produce decline of strength in the strongest.

Such cities as Boston, St. Louis and others in which physical education has received most attention have demonstrated by results the great value of corrective work upon the development of children. They have demonstrated also the value of physical measurements as a guide to practical methods in the promotion of this growth and development. The immense stimulus which their investigations have given to physical educators throughout the country is not a matter whose influence they have measured or perhaps counted upon in the inception of their work, but they have counted upon a definite influence upon the local interest in physical training in these cities and they are still prosecuting some form of investigation for scientific purposes which helps to stimulate local gymnastic and athletic interest.

It is for this practical pedagogic value I recommend the first general investigation, and afterward observations for purely scientific purposes, when more accurate results have become possible through the employment of medical experts upon our public school forces.

What we want now is some practical plan by which the public attention may be directed toward the necessity of systematic physical training for public schools. We have not Sparta's need of brawn; no stern autocratic hand lays down for us the laws of physical development which must be obeyed; Americans are termed "half developed" and rightly; they have never been sufficiently interested to pay the price of development. Since we are so independent as only to do the things which we wish, the only way to accomplish our physical good must be by arousing in us that interest sufficiently strong to impel us to our duty. The same systematic physical examination and physical training which exists in our colleges and universities must be extended to preparatory and public schools. The best initial step leading up to this ultimate end will be found to be that outlined above.

For the results herewith presented I desire to acknowledge indebtedness to Supt. C. G. Pearse for the personal interest and supervision which secured for me the material. His well known organizing ability was a guarantee of both expedition and of accuracy.

To the faithful unremitting labor of Dr. S. R. Towne, Mr.

Retzer and other members of the Omaha Physical Education Society is due in great measure my confidence in the reliability of the basal data.

For the tabulation and calculation of results I am indebted largely to my brother, Ernest E. Hastings, and to my wife.

And finally, for my initial interest in this form of investigation, and for many suggestions as to method, I am under lasting obligations to the work of Dr. Porter in the St. Louis schools.

THE RELATIVE IMPORTANCE OF THE HYGIENIC CORRECTIVE AND EDUCATIONAL AIM IN EXERCISES FOR COLLEGE STUDENTS.

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An intelligent consideration of this subject demands at the outset a definition of these three aims, as well as an analysis of the special conditions affecting college students. Such definition and analysis may be well introduced, however, by a brief résumé of the evolution of physical education in our colleges.

This history naturally divides itself into periods, the points of division marking progressive changes in the conception of the purpose and place of so-called bodily training in a scheme for higher education. In each period, whatever be their number, the purpose of physical exercise to the mind of the educator or director is well shown by the exercises given for its accomplishment.

The exercises of the acrobat or weight-lifter evidenced that it was considered valuable chiefly to develop the muscular system in size and strength, as a mere concomitant of the mind. The simple games of the campus, town-ball, foot-ball, running and jumping proclaimed health and recreation as their main objects. Were setting-up drills, with or without light apparatus, prominent and were special exercises prescribed on all sorts of intricate machinery it would be proof positive that the corrective object was strong in the director's mind.

When educational gymnastics were introduced—or better exercises used educationally—whether light or heavy, Swedish or German, eclectic or what not, but at any rate exercises devised to promote progressively neuro-muscular development, and that education of the senses and higher mental powers to which physical exercise was found to act as an adjuvant, then it became evident that the mind of the educator had risen to the conception of physical education as an education, not merely a name for the development of strength and the acquirement and maintenance of health and symmetry in the body.

We have enumerated as some of the proximate objects of the

physical education in our colleges in the past the muscular development and health, symmetry and education of the students. Each of these has its legitimate place in the ideal of the physical director today.

May we not wisely ask ourselves at this juncture, however, whether in eagerness to apply the latest scientific discoveries to physical education there is not danger of a departure from its major purposes; whether in some instances the scientific spirit has not riveted our gaze on some small section of the field to the injury of a bird's-eye view.

We do not forget that the college student of today differs somewhat in his physical needs from the one of fifty years ago.

The rise and spread of all forms of athletic exercise during the latter half of this century—aside from those done in the department of physical education—has indisputably improved the health and strength of college men, and has made necessary a somewhat different emphasis on the means used to satisfy their needs.

Granting at once that considerable differences in the material, and the conditions imposed upon it exist in the various colleges of our land, are there not a sufficient number of common conditions to justify an attempt to establish a rude platform expressive of the relative emphasis to be put on each of these three great classes?

We define the hygienic aim as that which looks—as the word implies—mainly toward the health of the individual. Exercises given with this aim have been well classed organic, in that they pay special attention to the proper development and functioning of the heart, lungs and other great organs.

The corrective aim is that which is directed chiefly to the correction of asymmetry, more especially that evidenced in the bony and muscular structures.

The educational aim we shall consider as making of prime importance neuro-muscular education to the highest degree and making large demands on the attention and the will.

It need hardly be stated that no exercise is of strictly hygienic or corrective or educational value. It must partake of at least two of them. But certain classes are chiefly valuable for one or another of these objects.

Let us now glance at the material, the students.

Perhaps nowhere in the new world is the material for investi-

gation and development more homogeneous than that furnished by the students in our eastern colleges.

Age, the factor which in greatest measure determines the character of exercise needed, is here fairly common. The vast majority of the students are between the ages of 18 and 25 years and that variation of 7 years means much less than it would some years earlier. The period of adolesence is about over and that of young manhood just begun. Stature is well nigh attained and all the bones have about reached their normal size. The vegetative organs have arrived at approximately the same stage of development. The heart is just concluding its last rapid gain in growth. The motor area of the brain is developed to almost its limit and the higher powers are presumably in the same period of change.

The nationality of the students is common in a majority of cases. In many eastern colleges 80 per cent of the grandparents of the students were born in this country. There is presented then little of the lack of uniformity which varied nationalities with their differences in stature, physical habits and mental characteristics exhibit.

There is considerable uniformity in residence. This is naturally less in large universities than small colleges, but a glance at the catalogue of any institution represented here will show what a circumscribed territory contributes 50 per cent of its students. Thus the effects which telluric conditions may produce on health, stature, or temper are somewhat uniform.

Most of the students are of the same social class. Rich men's sons we have and poor men's sons, but the bulk of them are from the great middle class and the upper stratum of that. They have had ample food, clothing and shelter, hygienically speaking, but seldom been indolent or pampered.

The students come to college with the same general ambitions and somewhat the same mental furniture. Uniformity in this particular at first sight seems to have but little bearing on the question of exercise. However, to one who has had to deal with young men of very variable, though only average mentality, the relatively uniform character of the ambition, will power, and teachableness of the student class is of some importance.

The conditions of college life entail fairly uniform habits among the students. Their hours of study and recitation, while variable, possess a certain uniformity in amount and kind. Students eat at about the same hours and approximately the

same kinds of food. Their sleep is, by statistics, not very variable in amount nor in the period when it is taken. In fact the conditions of life are quite common in the academic department and fairly so in the graduate schools.

Within these limits of general uniformity there are, of course, considerable variations. The inherited constitutions of college students vary greatly among themselves. The types of body and types of temperament are most important variables and demand consideration in any plan of physical education. An important difference is manifest in the stage of physical education already attained when the students come to college. Add to these variables variations among colleges, in the number of students, in the requirement or non-requirement of physical exercise and in the facilities furnished, and we have the main variations which need consideration.

When a student comes to college the golden age for neuromuscular education is passed. When a student is in college his mental powers are supposedly burdened enough with his studies. On these two statements hang all the law and the principles which underlie the arguments against the paramountcy of the educational aim.

The motor area of the brain is developed about all it will be by 18 years of age. The qualities of physical judgment, muscular control, physical courage, alertness, and the like, are most easily attained considerably earlier. The college curriculum throws sufficient work upon the attention and the will. The further tension of exercises which call in great measure on these powers is unwise.

Moreover a student can get along fairly well in his work and through life though he be a trifle ungainly and one shoulder is a half inch lower than the other or one leg a half inch longer. He may even do good mental work and enjoy life with one leg entirely gone, provided his vegetative functions are kept in order by plenty of invigorating hygienic exercise.

Having said this much it is clear that, in our opinion, exercises for health should be made predominant in any scheme of physical education for college students.

What the average student needs is exercise largely recreative, hygienic in character, exercise demanding little attention but much in foot-pounds. It must be borne in mind here that certain exercises evoke the attention by something inherent in themselves, while others demand it in the sense of requiring the will

continually active to maintain it. The factor of pleasureableness is largely responsible for this distinction. Students like hygienic exercises above all others, and while we allow that it is not always for the best to give them what they wish, yet a food that is relished is better digested and better assimilated than one which is unpalatable, though each contains the same amount of starches, sugars, fats and proteids. The pleasure experienced has its most beneficial effect on the brain and only by such exercises can the fullest mental recreation be gained. One needs but to glance at the faces of those engaged in Swedish educational gymnastics and in basket-ball games to decide which is the more recreative, the more hygienic.

Again such hygienic exercises are more educative than is often supposed for the duties which in after years the body will be called upon to perform. They compare to the frolic of the kitten, the gambols of the dog and the play of the young child, which develop the main centers for their use in life. They are corrective, too, in the broader sense, in that they bring into more harmonious working the great muscular masses of the body, and also the vital organs.

Good heart, good lungs, a good stomach, rich blood and a clear brain (if not so precociously developed) it is for these that hygienic exercises make most strongly. And what we mainly wish besidc, are legs long enough to reach the ground and shoulders broad and strong enough to carry the "white man's burden" and to keep on carrying it through thick and thin, year after year, and, in the cities, generation after generation.

While often abused, base-ball, foot-ball, tennis, track and field athletics and all manner of games practiced on green grass under blue sky and amid plenty of life-giving oxygen stand high in this class of exercises. It is interesting to note in this connection the gradual return, in the secondary schools of England, from gymnastics to athletics.

In the more distinctive field of the director, the gymnasium, the vigorous but simple almost automatic movements, especially those requiring the use of the large muscular masses of the back, waist and legs, would be found most efficacious. Running, jumping, boxing, wrestling, basket-ball and other gymnastic games are excellent. The route to health is by exercise generally via the legs and it may not be superfluous to remark here that man has not been sessile for many æons much as some gymnastic work would imply it. The warlike exercises practised at

Aldershot would well offset such ideas. They are largely running and leaping.

It must not be forgotten that the athletics of college give to about 25 per cent of the students in season sufficient, though not always well regulated exercise. There is left, however, the 75 per cent who probably take more exercise than did their fathers, yet regarding whom we are in doubt. They are men who need the work fully as much as the others. Then there are a few who have a distaste for any form of exercise.

The winter term, in our northern colleges especially, offers few facilities for exercise of this character and all students not training on our teams would then need our attention.

Exercises which have for their main object the correction of bodily defects might be placed second in importance. Comparatively few students suffer in any serious way while in college from vicious carriage or other evil positional effects, provided they take exercise sufficient in amount. Hygienic exercise as such pays little attention to the correction of asymmetry. Educative gymnastics pay more. Something else is needed, it is evident, to secure a symmetrical development in the great mass of students both for its immediate effect and especially its value in later life. An erect carriage, proper position of the spine, chest and shoulders in standing, walking and sitting mean much for the student both in college and when beyond the reach of the director. We have to consider, moreover, a smaller class which vicious attitudes and one-sided development, students whose needs special attention on account of effects already produced by form and, more important still, whose general health, is menaced or even impaired by this condition.

For the larger class just mentioned exercises most fitting would be setting-up drills, certain military work without apparatus, as marching and the like, special attention being paid to carriage.

The minority who are most in need would require in addition the individual work suited to each case.

Is there any considerable place then for the educational object in the scheme of work for college students? Undoubtedly. While it is relegated to third place in this list it is never to be lost sight of in the other two. All muscular acts are to a degree educational. Even the dullest and least enthusiastic in athletic sports and the work of corrective exercises will improve his

power of co-ordination and strengthen his will. He cannot use the same nerve cells all the time under the varying conditions. In general he will be able to use his muscular system better, which is another way of saying that his motor centers are better educated. The wise director may, quite unknown to the student, and it is his duty to so guide him in these exercises that their value becomes educatonial as well as health giving and corrective. Hence educational gymnastics do not require so great a space since they invade so largely other kinds of exercise.

Is it desirable then to attempt in the three or four years of college or university life, in view of the age of the students and their greater need of health and recreation, to make the exercises given a course in educational gymnastics? In many of our colleges now for at least part of the year gymnastic exercise is required. Here is a vast field for such a course if it is for the best interests of the students. To my mind, whether their exercises be voluntary or required such a course should be outlined. The gymnasium will lose in value if it be followed too slavishly, if hygienic or corrective work be neglected. While the most suitable period for neuro-muscular development is past, the motor centers are susceptible to education. The awkward student may become less so, the physically timid more courageous in gymnastic work, the sluggish more alert. It will be for most of the students and most of the course somewhat in the nature of a motor review, but in certain cases and in certain parts of the course not only will old nerve cells be re-stimulated but new ones educated. A course in outline could thus be introduced, beginning in Freshman year with elementary positions and movements in calisthenics and heavy gymnastics and progressing in a systematic way toward more complex and difficult exercises for as long as the class continued. Such a course would be of little value unless it could be continued with the same students for a considerable time. Hence it would be desirable, in cases where exercise was voluntary, to have the class registered with promise of faithful attendance and continuance.

SWIMMING, A NECESSITY IN EDUCATION.*

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Boston.

Benjamin Franklin, in his book, "The Art of Swimming Made Easy," says: "To put yourself in a right position for swimming, lie down gently on your belly, keep your head and neck upright, your breast advancing forward, your back bending; withdraw your legs from the bottom, and immediately stretch them out in imitation of a frog; strike out your arms forward and spread them open, then draw them in again towards your breast; strike forward, making use first of your feet, then of your hands, as many times as you can, and you will find this way easy and pleasant."

Certainly there are many ways to swim. "Keep yourself afloat and make progress; it matters little how it is done, as long as it is done." But there is one recognized way, for beginners at least, which both theory and practice have proved to be right; and in my search among American, English, French, German, Danish, Swedish and Norwegian books I have found all to be united on this question.

Before man knew how to build boats and bridges, he could swim. We know that the savage peoples of the islands in the Pacific Ocean are excellent swimmers. Swimming thus is not an invention of civilized nations. Still we always delight in knowing what the Greeks and Romans did. And, I can assure you, they knew how to swim. Among the Greeks it was customary to remark: "He can neither read nor swim," thereby expressing how utterly uneducated a man was. Homer, Aristotle, Plato, and others of the Greeks speak of swimming as a great accomplishment in those days.

Romans also considered swimming a necessary part of education in their greater days. The story about Cæsar, who saved himself by swimming from a sinking ship to another, holding his documents high over the water with one hand and the

*Paper read before the Boston Physical Education Society, December 8th, 1898.

general's coat in his teeth, is well known and also how Clolia with his ten girls swam across the river Tiber to flee from King Porsenus. The Roman soldier was by law compelled to learn to swim. And Roman history is full of instances of good swimming.

In other parts of Europe we find the same state of things in regard to swimming. Charles the Great was particularly fond thereof. And it was one of the seven necessities to become a knight in the Middle Age, to be a good swimmer. The old Vikings could "swim as well as they could row and sail a boat," and it was one of their great sports to play in the deep water and duck each other for a considerable length of time.

Admiral Tordenskjold, the greatest sea hero that northern Europe ever produced, and the one who made the most trouble for Charles the Twelfth, once when he had gone on shore in Sweden, found himself cut off from the sea by a company of cavalry. As their commander was going to receive Tordenskjold's sword, he made a sudden jerk, ran between the soldiers, jumped into the water, and swam with the sword in his teeth out to his ship, constantly diving to save himself from bullets which flew thick above his head. Lord Byron swam across the Hellespont. Captain Webb, August 24 and 25, 1875, swam across the English Channel. The actual length of the swim was 39½ miles, and he had then been in the water twenty-one hours and forty-five minutes.

Dr. Fridtjof Nansen tells us a thrilling story of how he, with his friend Johansen, had left their boat, well secured as they thought, at the edge of the ice—away up there in the Arctic Ocean. Suddenly they saw the boat drifting far out in a strong current; in his heavy clothes and boots Nansen threw himself into the water, trying to overtake the swift-going boat. The water was ice-cold, and he felt his limbs getting stiff, but as he says, "All we had was in the boat, and if I should stiffen and sink there or go back without the boat it would be just the same," and so he kept on with all his might. When he got tired he turned on his back to rest. At last, after a terrible struggle, he reached the boat, but for a long time he was unable to pull himself up and into it, till, with his last effort, he gathered all his strength, and was saved.

These are instances to show what can be done when we know how to swim, but I am sorry to say that there are as many instances which prove the utmost danger for those who cannot

swim. And one which concerns us more than any comes from the office of the adjutant general of the United States Army, who says that the number of soldiers drowned during the civil war was 4,959 from crossing rivers and by upsetting boats, when a few strokes would have saved their lives. Still, both the ability to swim and the disability thereof go to prove the necessity of the art of swimming in the national education.

There are plenty of writers on swimming in all languages, but it may be sufficient for us to consider a few of them. The well-known physician, Hieronymus Mercurialis, in his work, "De Arte Gymnastica," 1569, has two good chapters on swimming. Of great importance were Rousseau's and Basedow's writings in regard to swimming as a part of education. Guts-Muths and Jahn, the two great founders of the German gymnastics, included swimming as a part of physical training. Guts-Muths's "Instruction in Swimming" is probably the first and most important of its kind. He said: "Swimming must be of first importance in education." The Italian Bernardi wrote in 1794 a book on swimming as taught by him and brought forward the idea that the specific weight of the human body was lighter than water, and therefore must float as long as the head is held up. Dr. Benjamin Franklin in his book probably got much of his ideas from M. Thévenot's "L'Art de Narger," which was a standard book for many years. General von Pfuel established a swimming school in Berlin in 1817, and in his system of teaching by means of drill he first teaches the "frog-like" method.

The Frenchman Colonel d'Argy, whose method of swimming was introduced to the French army in 1851, founded the "land drill," which now is considered the first step in teaching swimming by all good instructors. Colonel Thomas H. Monstery in his "New Manual of the Art of Swimming" (New York, 1878), says: "Mr. George Seligman came to me February, 1876, and took his six lessons on dry land. Some time after that, in June, I went with him to one of the swimming baths and found that they had no swimming belt or pole, so that I was much puzzled what to do. Meantime it was spread abroad through the bath that I was 'the man who taught people to swim on dry land,' and the employees and bathers began to come and stare at us, expecting a good laugh. Finally I allowed Mr. S. to try without the belt under my directions, and he struck off with perfect ease, swam easily and rapidly on his breast, turned on his back and

showed four different styles of swimming besides floating. The people in the bath did not jeer any more."

Of reference books I consider "Swimming," by Archibald Sinclair and William Henry (London and Boston, 1893), and "Lehrbuch der Schwimmkunst," by Dr. Carl Euler and H. O. Kluge (Berlin, 1870), the best.

Early in the century swimming was recommended and used in the schools in Prussia as well as in the army. In Denmark, Sweden and Norway it is customary for the school children to have instruction in swimming during the summer instead of gymnastics; as a matter of course the gymnastic teacher must also be a teacher of swimming.

In Frankfort-on-Main a certain amount of money is set aside for swimming every year. In Paris and London certain schools have swimming as a part of their programme.

In this country Mr. Lieber probably established the first swimming school at Charles River in the times of John Quincy Adams. Kendall Green in Washington was the first school to open swimming baths. Brookline was the first town to give swimming instructions to the school children. But the first attempt in any city of the United States of free baths and instruction of swimming to all children was in Boston this last summer, (1898). Through his energy and interest in the public welfare, Hon. Josiah Quincy, mayor of Boston, made it possible for nearly eight thousand children to learn to swim. To quote from my own report to the Bath Department: "A system of registering each pupil was introduced, giving the date of entering, the name and age of the child, and the school it attended. Finally the teacher was to register the date when the pupil could swim alone. In this way it has been possible to keep an exact account of the number of pupils who have frequented the swimming school, and the direct number who have learned to swim, and also the average time it has taken to teach a child swimming. Girls registered 2040, learned 1322; boys registered 3339, learned 2526; total 5379, learned 3848. It has several times been impossible to find a boy after he has had a couple of lessons, but it is safe to say that these few lessons enabled him to learn to swim by his own practice. Everyone who knows anything about boys and their ways will know that when a boy has learned to swim he soon sets out to teach someone else. I therefore have no hesitation in saying that at least double the number of boys registered have indirectly learned to swim through Boston swimming

schools this summer; this with the girls registered makes a total of eight thousand."

This is the first and direct value of the swimming school this summer. Then comes the immense advertisement of the bathing places, made through the school and the children, which surely has brought thousands of people, who otherwise would not have taken baths. And so the health and cleanliness of a great many of Boston's populace has been promoted.

But there is another side from which the value of having the swimming instructor stationed at the bathing places should be judged, viz., the frequent accidents which have happened and only been saved from being serious by the quick action of the instructor present.

Even if the swimming school had not been successful in teaching the children to swim, the city of Boston should feel amply repaid by the many lives which have been saved through the instructors.

Still I feel satisfied that a fair judgment will say that the school has been a success.

To test the ability of the pupils, a series of exhibitions were held during the week of August 22, at the local beaches and floating baths, in which some twelve hundred children took part, and nearly five hundred badges were given as prizes.

There were seven events, viz.: graceful swim, 20-yard dash, 20-yard swim on back, standing dive, running dive, swimming under water and floating. The two best in each event at the local places were brought together for a final contest for medals —gold, silver and bronze—at the North End on Saturday, August 27, when His Honor Mayor Quincy presented the medals to the proud winners. More than three hundred children took part in this exhibition, and nearly seven thousand people were present and frequently showed their appreciation and enthusiasm of the children's performances, which certainly gave credit to their able instructors. There were ten teachers, with fifteen places for girls and fourteen for boys, and the instructions were given daily, except Sundays, from June 27 to August 31, or about nine weeks, Any child between nine and sixteen years of age was permitted to enter the school.

Some people came from New York, Baltimore and other cities to investigate our baths and method of instruction, and it is quite possible that next summer will see a great opening of swimming schools all over the country.

In order to prepare the children for the swimming instruction, I sent to all our grammar schools, first in May, a printed drill to be used in connection with the regular gymnastic lessons, and went myself to each school, showing the teachers and pupils how the exercises were to be taken and also encouraging the children to practice at home.

It has happened several times this autumn, when I have asked children who taught them to swim, that they have answered: "You taught me the strokes in the school, and then I learned myself."

Be this as it may. Several of the swimming instructors noticed that these children coming from our public schools where the drill had been practised learned to swim in half of the time of those coming from other schools where such drill had not been taught. And there can be no doubt that a good "land drill" is of the greatest value in teaching swimming, besides an excellent gymnastic exercise.

In nearly a score of books I have found the "land drill" advocated as the best way to begin, and the "breast-stroke" the only right foundation for all swimmers. The drills may differ a little in details, but essentially they are alike. The drill I use is as follows: "Arms swimming movement. One! (Both arms are bent in front of chest, flat hand down and thumbs touching.) Two! (Arms are stretched forward, thumbs touching.) Three! (Arms are moved sideways, with palms of hands turned slightly backward.) Standing on alternate legs, swimming movement. One! (Left knee is bent up and kept as far out as possible, the heel nearly touching inside of the other knee; the foot is bent upward.) Two! (The leg is stretched forcibly sideways.) Three! (The leg is moved in towards the other with straight knee.)"

When these strokes have been learned the pupil should lie down on a stool and practise the strokes of both arms and both legs at the same time, according to the counts.

The first lesson in the water, the pupils take hold of the rail or rope with their hands and practise the leg strokes; if it comes very hard to them, they are told to turn on their back, when the leg strokes are easier to perform. Having learned the strokes well, anybody can swim. It is often said that "it is the confidence you need; if you only have that, you can swim." This is not always so—ladies float easily and will soon acquire confidence in the water, and yet be as far from swimming as ever. But if the

strokes come to one as a second nature, he will soon acquire confidence and swim.

A great mistake is often made by over-anxious parents, when their children are afraid to go in, viz., to duck them. Such practice will only keep them away from the water.

After the strokes have been learned, I put the swimming belt on the first pupil, letting the others practise for themselves with the corkbelts. After a few minutes the next pupil is taken, and so on till in half an hour ten to twelve pupils have had their lesson. In this way I was able to teach nearly fifty pupils in two hours in my swimming school in Drammen, Norway, 1882. The first time they were allowed to swim away from the bridge, I swam with them till I knew they were safe. But even then accidents may happen, as, for instance, one cold day, I had not even changed my clothes, when I was holding one girl in the belt, I saw another, of about sixteen years, who had been swimming alone for some time, suddenly give up and go under, some distance away. I pulled the girl in the belt quickly up to the bridge and dived for the other, and had her soon on shore without any more danger; but it does not always come out so well, and it is a great responsibility for a swimming teacher to have large classes, so he should always be prepared for the worst.

After the pupil has learned to swim "Breast-stroke," he is taught to float and swim on his back; then to dive, standing and running. Now let us remember that "breath is life," therefore before diving take a few good, long inspirations and expirations, then finally fill the lungs and "go," and you may be able to keep under the water for quite a while—from one to two minutes even.

Following the diving comes the different strokes, as: "Side-stroke," "Over-arm-stroke," the "Trudgeon-stroke," which, by the way, is nearly the same as the South Sea Islanders use with such great results.

Then the rescuing of others, and for this purpose I believe the "Wilson drill," which is used by the Royal Humane Society in England, will be found excellent.

All swimming instructions ought to have this aim: to make pupils able to rescue drowning persons and to restore them to life. What more satisfactory aim can one have?

SECTIONS, DISTRICTS AND SOCIETIES OF THE A. A. A. P. E.

NATIONAL COUNCIL.

President: Dr. D. A. Sargent, Cambridge, Mass.
Corresponding Secretary: Dr. G. W. Fitz, 483 Beacon Street, Boston, Mass.

SECTIONS.

New England:
President: Dr. J. W. Seaver, New Haven, Conn.
Secretary: Miss Amy Morris Homans, Normal School of Gymnastics, Huntington Avenue, Boston, Mass.

DISTRICTS.

Michigan:
President: Dr. E. M. Mosher, Ann Arbor, Mich.

Nebraska:
President: Dr. S. R. Towne, Omaha, Neb.
Secretary: Prof. W. W. Hastings, University of Nebraska, Lincoln, Neb.

New York*:

Ohio**:
President: Dr. F. E. Leonard, Oberlin, O.

SOCIETIES.

Baltimore (Md.)*:
President: Mr. Wm. M. Mackdermott, Johns Hopkins University, Baltimore, Md.
Secretary: Miss Bertha Martien, Director, Physical Training, Maryland School for the Blind, Baltimore, Md.

*Not completely affiliated. **Not active.

Boston (Mass.):

President: Dr. R. W. Lovett, 234 Marlborough Street, Boston, Mass.

Secretary: Dr. Mary Rees Mulliner, 160 Newbury Street, Boston, Mass.

Bridgeport (Conn.)**:

Chicago (Ill.)*:

President: Miss Julia Culver, 323 Chicago Avenue, E. Chicago, Ill.

Secretary: Mr. Clark K. Peterson, 5412 Ellis Avenue, Chicago, Ill.

Cincinnati (Ohio)**:

Cleveland (Ohio)**:

College Gymnasium Directors:

President: Dr. Wm. G. Anderson, Yale University, New Haven, Conn.

Secretary-Treasurer: Dr. W. L. Savage, 308 West 59th Street, New York, N. Y.

Detroit (Mich.)**:

Hartford (Conn.)* **:

Hudson River Branch (Poughkeepsie, N. Y.)**:

Lincoln (Neb.):

President: Prof. A. R. Hill, University of Nebraska, Lincoln, Neb.

Secretary: Dr. Robert H. Wolcott, University of Nebraska, Lincoln, Neb.

New Haven (Conn.):

President: Mr. Louis Leyerzapf, 545 Grand Avenue, New Haven, Conn.

Secretary: Miss Annie R. Hughes, Anderson Gymnasium, New Haven, Conn.

New York (N. Y.):

President: Mr. J. Blake Hillyer, 106 Broadway, West New Brighton, Staten Island, N. Y.

Secretary: Mr. Alexander E. Wilson Barker, 308 West 59th Street, New York, N. Y.

***Not completely affiliated. **Not active.**

Omaha (Neb.):

President: Dr. S. R. Towne, Central Bldg., Farnham Street, Omaha, Neb.

Secretary: Mr. C. G. Pearse, Supt. of Schools, Omaha, Neb.

Philadelphia (Pa.)**:

President: Dr. C. E. Ehinger, Normal School, West Chester, Pa.

Secretary: Miss Esther Kuhn, 429 Green Street, Philadelphia, Pa.

Southern Michigan*:

President: Miss Alice G. Snyder, Ann Arbor, Mich.

Secretary: Miss Nellie Sutton, The Utopia, Detroit, Mich.

Springfield (Mass.)* **:

Syracuse (N. Y.):

President: Col. Verbeck, St. John's School, Manlius, N. Y.

Secretary: Miss Ada F. Thayer, 503 East Willow Street, Syracuse, N. Y.

*Not completely affiliated. **Not active.

REPORTS OF SOCIETIES.

BALTIMORE PHYSICAL EDUCATION SOCIETY.

The regular monthly meeting of the Baltimore Physical Education Society was held January 31st in the Trophy Room of the Johns Hopkins University Gymnasium.

The following officers were elected for the year: President, Mr. Wm. M. Mackdermott, Director of the Johns Hopkins University Gymnasium; First Vice President, Miss Esther Porter of the Medical Gymnastic Institute; Second Vice President, Mr. C. F. Emil Schulz, Director of Physical Training in the Public Schools of Baltimore; Secretary-Treasurer, Miss Bertha Martien, Director of Physical Training in the Maryland School for the Blind.

The Standing Committees will be appointed at the next meeting on February 15th, at the Medical Gymnastic Institute.

BERTHA MARTIEN,
Secretary-Treasurer.

February 3, 1900.

BOSTON PHYSICAL EDUCATION SOCIETY.

At the annual meeting of the society, held January 11, 1900, the reports of officers and standing committees showed the past year to have been fairly prosperous.

The President suggested the formation of four sections for associating those particularly interested in special lines, viz., Anthropometry, Medical Gymnastics, Normal Schools and Gymnasia, and Public School Work. These sections are now in process of organization, and it is hoped that they will greatly strengthen our usefulness.

The Treasurer reported the receipt of $128 for dues, and the expenditure of $81.20. With the balance of $53.90 from last year, there is now a balance of $101.70 (one dollar was credited for interest).

The Committee on Theory and Statistics through the chairman, Dr. Geo. L. Meylan, recommended that the society undertake the measurement of several thousand of school children.

There is now a prospect of this being carried out, as the Boston School Committee seems inclined to countenance such work. A committee of five, of which Dr. D. A. Sargent is chairman, has been appointed to carry out the recommendation.

The Committee on Publication and Bibliography, Dr. C. J. Enebuske, chairman, reported in favor of establishing a library for the society, and recommended the appropriation of a certain sum yearly for several years to purchase books on Physical Education, which could be added to those in the Boston Public Library, and set apart as a special library.

This recommendation has not yet been adopted, but doubtless will be arranged for in the near future.

The Technical Committee, through Mr. H. Nissen, gave a résumé of the condition and use of the public baths, gymnasia and playgrounds in Boston, and urged a more active interest by the society in such institutions.

In this connection may be mentioned the appointment of a "Local Outlook Committee," of which Dr. E. M. Hartwell is chairman, to keep itself and the society informed of what goes on in the neighborhood of especial interest to us, and to help make the society of weight in such matters as naturally belong to Physical Education.

The annual election resulted in the following list of officers: President, Dr. Robert W. Lovett; First Vice President, Dr. John Bapst Blake; Second Vice President, Miss Jennie M. Colby; Secretary, Dr. Mary Rees Mulliner; Treasurer, Miss Harriet E. Hutchinson. Additional members of the Executive Committee: Mr. Hartvig Nissen, Miss Laura S. Plummer, Dr. Geo. L. Meylan.

The Secretary's report summarized the work of the society for the past year, and is, in part, as follows:

The society began the year with 179 members. Twenty-seven have been dropped as being two years in arrears for dues; two have withdrawn, and 43 have joined, making the total membership at this date, 193. It is made up of 152 full members, i. e., those belonging also to the A. A. A. P. E., 37 who are associates or members of the Boston society only, and four advisory members. Of these 114 are women, and 79 men.

A fair attendance has been the rule throughout the year, the largest number being present at the November meeting. The papers read before the society have been as follows:

"On Nerve Exhaustion," by Dr. E. W. Taylor.

"The Correlation of Physical Training to Public Education," by Rev. W. Scott, secretary of the N. E. Education League.

"The Present Status of Physical Education in the Public Schools of Boston," by Mr. H. Nissen.

"Methods of Athletic Training," by prominent trainers and athletes—"Long Distance Running," by Mr. Arthur Blake; "Rowing," by Mr. Richard Glendon; "Long Distance Swimming," by Mr. Peter McNally; "Interscholastic Sports," by Mr. James Lathrop.

Of especial interest, under the above general heading, was the report of the examination of the physical condition of the men competing in the so-called "Marathon Race," conducted by the B. A. A. Dr. Horace Arnold described the tests made before and after the race, and the conclusions that were justified.

The Fall season opened in November with a meeting devoted to "Rest," papers being presented on the subject by Miss Anna Payson Call and Miss Hope W. Narey.

The December meeting considered "School Hygiene," with a paper by Dr. Theodore Hough.

The Boston Society entertained nearly two hundred of the delegates and members of the A. A. A. P. E. at Fay House on the Cambridge day of the Convention in April.

MARY REES MULLINER,
Secretary.

CHICAGO PHYSICAL EDUCATION SOCIETY.

The annual meeting of the Chicago Physical Education Society was held at Miss Culver's gymnasium, 323 Chicago ave., on February 24.

The officers elected for the year were: President, Miss Julia Culver; Vice Presidents, Mrs. C. B. Murray, Miss J. A. Norris; Secretary-Treasurer, Mr. Clark K. Peterson; Executive Committee, Mr. E. B. DeGroot, Miss L. W. Sanborn, Miss E. N. Douglas, Mr. G. W. Ehler.

The subject for discussion was "Play in Relation to Gymnastics." While recognizing the importance and value of play in a rational system of Physical Training, the society felt that there was a tendency to overestimate its value. The reasons why this should be the case to such an extent throughout the west were discussed at some length.

The society will endeavor to make arrangements for a public exhibition of gymnastic work in the Spring, at which the various schools and colleges will show some portion of their class work.

The attendance at this meeting was very satisfactory, and the society feels very much encouraged at the interest shown by the various teachers of physical training in Chicago and vicinity. Luncheon was served by Miss Culver, and the meeting was thoroughly enjoyed by all present.

CLARK K. PETERSON.
Secretary.

February 27, 1900.

SOCIETY OF COLLEGE GYMNASIUM DIRECTORS.

The third annual meeting of the Society of College Gymnasium Directors was held at the Yale University Gymnasium, New Haven, Conn., on December 29 and 30, 1899.

The following were present: Dr. Sargent, Harvard; Dr. Seaver, Yale; Dr. Anderson, Yale; Dr. Hitchcock, Amherst; Dr. Phillips, Amherst; Dr. Babbitt, Haverford; Dr. Banning, Colgate; Dr. Stroud, Tufts; Prof. Goldie, Princeton; Prof. Cann, New York University; Prof. Bolte, Bates; Prof. Velte, Trinity; Dr. McKenzie, McGill; Dr. Miller, University of Pennsylvania; Dr. Savage, Columbia; Dr. Cummings, Strathmore.

Dr. Sargent opened the meeting with an address. The points brought out in his paper were freely discussed by nearly all present.

Dr. Anderson next introduced the question, "What is the best means of preventing students from entering athletic contests when in a crippled condition." In the subsequent discussion the relationship between the athletic trainer, coach and physical director was considered at length. A committee of three was appointed to report at the next meeting upon the plan of relationship which should exist between the department of physical training and the athletic interests, with the purpose of urging its adoption, when voted by this society, upon the faculties of universities and colleges. Drs. Anderson, McKenzie and Phillips were appointed to serve upon this committee.

The subject, "What should be the physical standard to guide the physical directors in passing candidates for athletic teams," was introduced by Dr. Watson L. Savage. The various athletic sports were classified upon a basis of the power exerted and the

resulting strain upon the vital organs. In the discussion which followed, special interest was manifested in the effect of strain upon heart action. The general opinion was that during sudden exertion, abnormal sounds and distinct murmurs were produced in untrained hearts, but that these quickly disappeared under normal conditions, and also under a regular course of training.

A committee consisting of Drs. Seaver, Miller and Savage, was appointed to consider the advisability of determining the condition of a candidate for gymnastic or athletic exercises preparatory to his admission to them. It is hoped that the work of this committee will emphasize the importance of appointing medical men at the head of this department in colleges and universities.

Dr. Anderson read a paper upon the question, "How can a greater interest be awakened in physical training for its own sake." The opinion that the work must be made interesting, progressive and scientific, and that games are advantageous if kept strictly under control, found general acceptance.

The paper of Dr. Miller upon certain tests with the grip dynamometer showed the relation between the power of the grip and the size of the forearm. The size of the forearm was measured by plunging the hand slowly into a vessel of water and weighing the overflow.

As Dr. Linhart, of Ohio State University, was absent, his paper was omitted.

The following papers were also read: "The College Athletic Trainer," by Dr. Seaver of Yale, and "The Purpose of Physical Training in Colleges," by Dr. Phillips. The report of the committee on strength tests was considered to justify the continuance of their work for another year. Members of the society were recommended to make comparative tests upon "chinup," in the following ways: front, reversed, hands front, hands reversed, and chinning on parallel bars or rings. They were also advised to make comparative tests of the lungs on the spirometer and manometer, and complete tests of the dip with and without a wall in front to prevent the tipping forward of the body.

The Committee on Nomenclature reported progress and was requested to prepare a full report for the next meeting of the society.

The Committee on Credit for Gymnastic Training in College Work reported progress, and was instructed to prepare a more definite report for the next meeting.

The membership of the society numbers 26.

The election of officers resulted as follows: President, Dr. Wm. G. Anderson, Yale; Vice President, Dr. R. Tait McKenzie, McGill University; Secretary-Treasurer, Dr. Watson L. Savage, Columbia University; Council, Dr. Caspar W. Miller, University of Pennsylvania, and Dr. Paul C. Phillips, Amherst.

The following members were admitted: Charles C. Stroud, Tufts College; Fred E. Parker, Brown University; Wm. W. Bolster, Jr., Bates College; and James C. Elsom, University of Wisconsin.

W. L. Savage,
Secretary-Treasurer.

January 10, 1900.

NEW HAVEN PHYSICAL EDUCATION SOCIETY.

The monthly meeting of the New Haven Physical Education Society was held Friday, January 19, 1900, at the Yale Gymnasium.

The following officers were elected for 1900: President, Mr. Louis Leyerzapf; First Vice President, Dr. J. W. Seaver; Second Vice President, Dr. W. G. Anderson; Secretary and Treasurer, Annie Rennard Hughes; Council, Dr. E. H. Arnold, Mrs. Eugene Buckman and Miss Lottie O. Evarhard.

Twelve new members were elected, after which Dr. Anderson gave a talk on "Physical Training in Germany."

Annie Rennard Hughes,
Secretary.

NEW YORK PHYSICAL EDUCATION SOCIETY.

The annual meeting of the Physical Education Society of New York and Vicinity, was held on December 16, 1899, at the Dr. Savage Gymnasium, 308 West 59th Street, the President, Dr. J. Gardner Smith, in the chair. The reports of the standing committees were read, as well as the report of the Secretary and the Treasurer, which showed a fairly good balance in hand.

The election of officers for the year resulted as follows: President, Mr. J. Blake Hillyer; First Vice President, Dr. Watson L. Savage; Second Vice President, Miss Jessie H. Bancroft; Secretary-Treasurer, Mr. Alex. E. Wilson Barker. The Executive Committee includes in addition to the above: Dr. Henry Ling Taylor, Dr. Walter Truslow, Dr. Elias G. Brown and Miss E. C.

MacMartin. A very hearty vote of thanks was given to the retiring officers, particularly in the case of the Secretary, who was unanimously elected President.

It was decided to send an exhibit to the Paris Exhibition, and a committee of five, with Mr.Hillyer as chairman, was appointed to arrange matters. Dr. Bissell and Dr. Savage offered their respective rooms for the meetings of the society at all times, and as the library was already located at Dr. Savage's and his Institute open both day and evening, this offer was accepted. On the proposition of Dr. Savage, it was voted that in future all routine business be left in the hands of the Executive Committee, and that the regular meetings be devoted to the reading of papers, discussions and such other matters as the committee might direct. Dr. J. Gardner Smith then delivered his annual address on "Competitions and Prizes," and contrary to custom a short discussion took place, which proved most interesting.

The following new members were elected: Miss Stella Fairlamb, Miss Ada Membery, Mr. A. H. Devold, Mr. A. A. Oye, Mr. J. R. Helm, Dr. Hedvig Malmstrom, Mrs. Albin Barnes.

The regular monthly meeting of the Physical Education Society of New York and vicinity was held at the Dr. Savage Gymnasium on January 20, 1900, President J. Blake Hillyer in the chair.

Dr. Henry Ling Taylor donated a number of valuable books and pamphlets to the scociety and a vote of thanks was passed to him for the same.

The Secretary presented a set of resolutions best calculated to further the practical working value of the society, and after some discussion the matter was left in the hands of the Executive Committee to deal with as best suited the interests of the society. Mr. Ossian H. Lang, editor of the "School Journal," gave a valuable and interesting address on "Physical Education in schools from the standpoint of the general educator."

The following new members were elected: Miss E. T. Robinson, Miss M. A. Harvey, Mr. Jacob Parker.

ALEX. E. WILSON BARKER,
Secretary-Treasurer.

SOUTHERN MICHIGAN BRANCH OF THE A. A. A. P. E.

At a meeting held in Detroit, Mich., January 20th, a paper was read by Dr. Inglis of Detroit, entitled, "Physical Culture in Our Public Schools from the Standpoint of a Doctor." The paper

called forth a very general and, for the most part, favorable discussion. It was generally agreed that there is not enough play introduced into the school work, and it was also recognized that systematic training is needed in connection with play to form habits of correct posture, etc.

The next meeting will be held in Detroit on Saturday, April 7.

NELLIE SUTTON,
Secretary-Treasurer.

February 19, 1900.

SYRACUSE PHYSICAL EDUCATION SOCIETY.

The January meeting of the Syracuse Physical Education Society was held at the Y. M. C. A. rooms, Saturday evening, on the 26th, and in spite of a severe rain eight members were present.

Mr. Golden, director of the gymnasium, gave a practical talk upon "Y. M. C. A. Gymnastics." He stated that the method used was really a combination of exercises taken from all systems of gymnastics, and arranged to meet the needs of business men, growing boys and the rougher street element. It has been found that sharp, vigorous movements are necessary to hold the attention, and accuracy and polish are therefore generally sacrificed to the demand for enthusiastic activity. The Y. M. C. A. gymnastics abound in strong forward and backward bendings, especially the latter, which serve to counteract the indoor, stooping life of the majority of their patrons. Perhaps the strongest reason for the existence of the Y. M. C. A. gymnasia is the far-reaching moral influence exerted on the rougher element of city life; they create a desire for athletics and wholesome sports and thereby bring within christianizing influences those who ordinarily pass their leisure time in bar-rooms.

The talk was supplemented by a vigorous drill given by some fifty boys in regulation Y. M. C. A. gymnasium costume. A game of basket-ball completed the programme.

The meetings thus far have been devoted to a consideration of various gymnastic methods, illustrated by class work.

A new method for arranging programmes has been adopted by the society. At the beginning of the season the Executive Committee presented a list of topics for the monthly meetings of the year. These topics were assigned to different members, each of whom was held responsible for the speakers and matter presented at one meeting.

The February meeting of the society occurred on the 17th at the Y. M. C. A. rooms, all the members being present.

Dr. John Plant gave a talk on "Spinal Curvatures." He expressed the belief that few diseases with which physical trainers come in contact are as unsatisfactory in results, largely because of the lack of perseverance on the part of the patient. Photographs and illustrations were shown. It was voted to hold a special meeting in two weeks to continue the discussion.

After a short consideration of business, the meeting adjourned.

ADA F. THAYER,
Secretary.

February 16, 1900.

REPORT OF THE COUNCIL.

Council meeting, December 8, 1899.

Present: Drs. Sargent, Fitz, Mulliner, Mr. Eberhard, Miss Narey, Baroness Posse.

The Council received a delegation from the Boston Physical Education Society to consider the question of membership in the society and the method of collecting dues. After discussion, the Council reiterated its previous interpretation of the Constitution as follows:

Local societies cannot have as members with full powers persons who are not also members of the national organization, but each society has a right to make any arrangements it desires with persons who are interested in physical training, but who do not wish to join the national organization, whereby such persons may receive notices of the meetings and other privileges, except voting. Representation in the National Convention shall be based only on the number of regular members in the society.

It was decided that local Secretaries should collect and transmit to the Corresponding Secretary, the dues to the national association from their members.

The new members elected are: C. H. Thurber, Chicago University, Chicago, Ill.; Miss Lillian Bacon, Honolulu, Hawaiian Islands; Miss Florence H. Slack, Providence, R. I.; Walter W. Davis, Grinnell, Ia.; Dr. A. M. Clark, Youngstown, O.

The Treasurer, Mr. Eberhard, reported, balance on hand, $149.31.

The Corresponding Secretary, Dr. Fitz, reported receipts for October and November, $44.00; expenditures, $46.57.

Baroness Posse, Dr. Mulliner and Miss Narey were appointed a committee to suggest ways and means of arousing interest in the formation of local societies.

Meeting adjourned.

Council meeting, January 5, 1900.

Members present: Drs. Sargent, Hitchcock, Fitz, Mulliner, Mr. Eberhard, Baroness Posse.

The Treasurer reported receipts for December, $44.00; expenditures, $142.46; balance on hand, $50.85. For the year 1899: January 6th, 1899, $287.73; receipts during the year as per monthly reports, $776.66; total, $1,064.39. Expenditures during the year as per monthly reports, $1,013.64. Balance on hand, December 31, 1899, $50.75.

The Corresponding Secretary reported receipts for December, 1899, $29.01; expenditures, $21.03. For the year 1899 receipts for dues, $607.00; subscriptions to REVIEW, $42.00; sale of reports, REVIEWS, reprints, etc., $85.81; society certificates, $10.00; total, $744.81. Total expenditures on account of Corresponding Secretary and Editor of REVIEW, $284.40. Number of members paid dues for 1899, 567; number of members resigned in 1899, 22; number of new members in 1898, 96; and in 1899, 128.

The Finance Committee reported the recommendation that the Editor of the REVIEW should be paid at the rate of three hundred dollars per annum. Voted by the Council.

After a discussion of the representation of the Society at Paris in the Congress of Physical Education, the meeting adjourned.

Meeting of the Council, February 2d, 1900.

Present: Drs. Sargent, Hitchcock, Fitz, Mulliner, Mr. Eberhard, Miss Narey and Baroness Posse.

The Treasurer reported receipts for the month of January, $29.01; expenditures, $21.03; balance on hand, $58.73.

The Corresponding Secretary reported for the month of January, receipts, $161.44; expenditures, $72.99.

Voted, that the Society of College Gymnasium Directors shall be accepted as a branch society of the A. A. A. P. E.

The following were elected to membership in the National Association: Miss Mollie Seeley, 1289 Commonwealth Avenue, Allston, Mass.; Miss Anne Hodges, 26 Perrin Street, Roxbury, Mass.; Miss Florence Chadwick, 10 Herwick Park, Boston, Mass.; Miss Dorothy Underhill, 127 Pembroke Street, Boston, Mass.; Miss Mary Bennett, 46 Rutland Square, Boston, Mass.; Miss Ethel Patterson, 8 Montrose Street, Roxbury, Mass.; Miss Ethel Fernald, 53 Youle Street, Melrose, Mass.; Miss Marion Knapp, 20 Chestnut Street, Boston, Mass.; Miss Mabel Cherry, 30 St. James Avenue, Boston, Mass.; Miss E. Blanche Sterling, 13 Concord Square, Boston, Mass.; Miss Mary Churchill, 32 Greenwich Park, Boston, Mass.; Miss Josephine Bakewell, 32 Greenwich Park, Boston, Mass.; Miss Alison Beard, 13 Cutter

Street, East Somerville, Mass.; Miss Mary Weir, 13 Concord Square, Boston, Mass.; Miss Therese K. Palmie, 171 Warren St., Brooklyn, N. Y.; Miss Matilda A. Brandt, Ottumwa Y. W. C. A. Gymnasium, Ottumwa, Ia.; Mr. Robert L. Erd, Flint, Mich.; Dr. Caroline Spencer, 1320 North Nevada Avenue, Colorado Springs, Colo.; Mr. Clark K. Peterson, 5412 Ellis Avenue, Chicago, Ill.; Miss Alice Dickinson, 468 Massachusetts Avenue, Boston, Mass.

BARONESS ROSE POSSE,
Recording Secretary.

OFFICIAL ANNOUNCEMENT.

On account of the difficulties attendant upon the use of the name "Committee of Fifteen" proposed for the committee authorized by the vote of the Convention at its meeting on April 5th, 1899,* "to draught definite recommendations for securing a fuller recognition of physical training in elementary, secondary and higher educational institutions," because of the former existence of the Committee of Fifteen of the N. E. A., it has seemed wise by enlarging the committee to change its name. In lieu of a vote of the Association, I hereby announce that the committee will henceforth be known as the Committee of Seventeen in the absence of objection on the part of members of the Association. Such objection, together with the reasons therefor, should be communicated at once.

The Committee is made up of the following members:

President William Dewitt Hyde, Bowdoin College, Brunswick, Me.

President G. Stanley Hall, Clark University, Worcester, Mass.

Hon. Wm. T. Harris, Commissioner of Education, Washington, D. C.

Professor E. W. Scripture, Yale University, New Haven, Conn.

Professor William James, Harvard University, Cambridge, Mass.

Professor John M. Tyler, Amherst College, Amherst, Mass.

Professor H. P. Bowditch, Harvard Medical School, Boston. Mass.

Professor James M. Cattell, Columbia University, New York City.

Professor Joseph Jastrow, University of Wisconsin, Madison, Wis.

*American Physical Education Review, Volume IV, No. 2, p. 197.

Dr. Charles H. Henderson, Pratt Institute, Brooklyn, N. Y.
Dr. Edward M. Hartwell, 5 Brimmer St., Boston, Mass.
Dr. E. H. Bradford, 133 Newbury St., Boston, Mass.
Dr. L. Emmet Holt, 14 West 55th St., New York City.
Professor Paul H. Hanus, Harvard University, Cambridge, Mass.
Dr. Henry Ling Taylor, 60 West 55th St., New York, N. Y.
Dr. B. Sachs, New York, N. Y.
Professor Henry H. Donaldson, Chicago, Ill.

D. A. SARGENT, President.

Cambridge, Mass., March 1, 1900.

MINISTÈRE
DU COMMERCE,
DE L'INDUSTRIE,
DES POSTES
ET DES TÉLÉGRAPHES.

REPUBLIQUE FRANÇAISE

Exposition Universalle de 1900.
DIRECTION GÉNÉRALE
De L'Exploitation.

Congrès Internationaux.

Paris, December 14, 1899.

CONGRÈS INTERNATIONAL DE L'ÉDUCATION PHYSIQUE.

(Paris, August 30th to September 6th, 1900.)

Dear Sir:—The International Congress of Physical Education will open in Paris on Thursday, August 30th, and will close on Thursday evening, September 6th, 1900.

Its object is to define and extend the conception of physical education by connecting it with the scientific conditions of human perfection,—physical, intellectual and moral.

The Congress will be unable to do justice to so vast a subject in a single session, since physical education is related to philosophy and the biological sciences, and includes a special technique, pedagogy and propaganda. While preserving the general character of this programme, we have introduced into the order of the day a certain number of specific questions chosen from each of the five divisions.

Nevertheless, we beg you to develop those questions which have special interest for you outside of the specific propositions presented, provided that such questions relate to the subject matter of the following programme.

Kindly indicate, when you send us word of your coöperation, the subjects which you propose to treat. Papers, which should be in the form of a written communication and of scientific character, and *which should conclude preferably with practical propositions in concise form,* cannot be received after the fifteenth of June.

These propositions, after being examined, will be accepted, published and addressed to each member before the opening of the Congress. They will be studied at the meetings of the commissions and upon them only will the discussions in the general assemblies be made.

The Congress will also propose the nomination of a technical and permanent International Commission. Thanks to the justifiable authority which the members of this commission will enjoy, we shall hope to hasten the evolution of physical education by opposing to the prejudices of empiricism, scientific facts and truths.

You will find accompanying the present circular the list of the members of the Commission of organization, the composition of the bureau, the general programme, the questions for the order of the day, a development of these questions and a circular asking for your coöperation.

The fee is fixed at ten francs.

We count upon your valued coöperation in making an active propaganda in favor of the eminently humanitarian movement to which we invite you.

Be so kind, my dear sir, as to accept the assurance of our highest regards.

LEON BOURGEOIS, President.

GEORGES DEMENY, General Secretary.

GÉNÉRAL BONNAL,
DR. BOUCHARD,
F. BUISSON,
BARON DE COUBERTIN,
Vice-Presidents.

COMMISSION D'ORGANIZATION.

BUREAU.

Président.

M. Léon Bourgeois, député de la Marne, rue Palatine, 5.

Vice-présidents.

MM. le général Bonnal, à Beauvais.
Buisson, professeur à la Sorbonne, boulevard du Montparnasse, 166.
le docteur Bouchard, membre de l'Institut, rue de Rivoli, 174.
le baron Pierre de Coubertin, président du Comité international des jeux olympiques, rue de Lubeck, 40.

Secrétaire général.

M. Georges Demeny, professeur du Cours supérieur d'Éducation de la ville de Paris, ancien chef de laboratoire de la Station Physiologique, rapporteur de la Commission supérieure d'éducation physique au Ministère de l'instruction publique, avenue de Versailles, 95.

Secrétaires.

MM. Crinon, professeur de gymnastique, ancien directeur de la Gymnastique française, rue des Fossés-Saint-Jacques, 22.
Lhermitte, professeur de gymnastique, rédacteur en chef du Stand, rue Saint-Jacques, 242.

Secrétaires adjoints.

M. Bocquillon, professeur de gymnastique, étudiant en médicine, rue Tournefort, 22.
Mlle. Jenny Billoud, institutrice, rue des Bons-Enfants, 28.

Trésorier.

M. Asthon Passerieu, président de la Commission des admission pour la fête fédérale de 1900, rue Gérando, 5.

Membres.

MM. Bédorez, directeur de l'enseignement primaire de la Seine.
Berteaux, député.
Mlle. Billoud (Jenny), institutrice.
Binet, directeur du laboratoire de psychologie physiologique de la Sorbonne.
Bocquillon, professeur de gymnastique, étudiant en médicine.
Bonnal (général), commandant la place de Beauvais.
Bourgeois (Léon), ancien misistre, député de la Marne.
Buisson, professeur à la Sarbonne, ancien directeur de l'Enseignement primaire.
Collineau (Dr.).
Corra (Émile), chef de bureau au Ministère du commerce, ancien président du Cercle de Gymnastique Rationelle.
Crinon, professeur de gymnastique au collège Sainte-Barbe, ancien directeur du journal la Gymnastique française.
Demeny (Georges), professeur du cours d'éducation physique de la ville de Paris, ancien chef de laboratoire de la Station physiologique.
Dérué (colonel), inspecteur de la gymnastique dans les écoles de la ville de Paris.
Duponchel, commandant au 5 o^{e} régiment d'infanterie.
Lagrange (docteur), directeur de l'Institut Zander.
Lhermitte, professeur de gymnastique, rédacteur en chef du Stand.
Marey (Dr.), membre de l'Institut, professeur au Collège de France.
Petit (Édouard), inspecteur général de l'Instruction publique.
Tissié (Dr.), inspecteur de l'Éducation physique dans l'Académie de Bordeaux, président de la Ligne girondine de l'éducation physique.
Vaillant, député.

GENERAL PROGRAMME

AND

CLASSIFICATION OF SUBJECTS CORRESPONDING TO SECTIONS.

SECTION I.

Philosophy.

1. The ideal problem of physical education and its practical realization.
2. The equilibrium of the human being in its triple activity—physical, intellectual and moral.

   The circumstances which destroy this equilibrium and the consequences to the individual and to society.
3. The causes of the physical deterioration of the human race.
4. The ideal aim of physical education as opposed to the pursuit of brute force.
5. The unity of educational methods based upon natural laws and conforming to the human organization.
6. The importance of education as a means of opposing the hereditary vices of youth.
7. The economic importance of physical education from the social standpoint.
8. The intimate relations existing between physical, intellectual and moral education.
9. The necessity for the intervention of public authority in order to bring about new customs and to struggle against the prejudices and errors which are disseminated in physical education.
10. Methods of convincing men of activity and of bringing about truly scientific methods of education.
11. To what degree ought one to take acount of actual prejudices and imperfect methods in the reform of education and its scientific evolution?
12. Discipline as the basis of education, but upon the condition that it shall be subordinated to natural laws and not to irresponsible conventions.

Section II.

Applied Biological Sciences.

1. The biological sciences by determining the exact effects of exercise upon the human body ought to insure harmony between the methods and aims of education.
2. All the functions of life are inter-related and depend upon the nervous system. The muscles are but instruments commanded by the nervous centres; as an educational deduction, the study of psychic phenomena ought to be placed before that of other functions.

   The reciprocal action of psychic functions upon the functions of life.

   The education of the senses, perceptions and sensations.
3. Hygiene and education of functions in their relation to exercise.

   The education of the perceptions and sensations.
4. Laws of evolution of individuals and of human races.
5. The influence of heredity, environment, alimentation, régime, activity, rest and professional habits upon the individual.

   The limits of the modifiability of the individual; characteristic types of professional specialties.

   Contributions to zootechny.
6. Man considered as the producer of energy.

   The personal coefficient of energy; means of increasing it.

   Different forms of human energy; statical effort and muscular exercise; nervous energy.

   Excitants of energy; foods and poisons of the nervous system.

   Study of the processes of force production; results.
7. Study of the form, proportions, volume and density of the body from the point of view of its adaptation to a given work, in particular to locomotion with the hands.
8. Parallelism between the effects of spontaneous exercises and of rhythmic, directed exercises.
9. Nervous and muscular fatigue. Nervous and muscular expenditure; their relative values.
10. The direction and utilization of human energy.

    Verification of the law of least effort.

11. The mechanism and coördination of movements.
Measure of mechanical and physiological effort; comparison of effort expended in different movements.
12. The realization of economy of energy in the acts of locomotion and in the different habitual movements.
The preponderant influence of rhythm upon the quantity of energy expended.
13. Different effects of exercise from the point of view of the quantity of energy expended, the nature of the movements and the method of execution.

Section III.

Technique.

1. How in a given case the educator can make use of modifying factors for the benefit of the individual and of the race.
2. The rules of education capable of giving the best results in exercise from the point of view of hygiene, of the normal development of the body, of skill and of the best utilization of muscular force practically applied.
3. An application of the rules of education to apprenticeships in manual training, as well as to artistic professions; design, music, dancing, etc.
4. Means of increasing the outcome of work and of extending the limits of fatigue in the individual.
5. Gymnastic corrections for the defects inherent in different professions.
6. Application of the laws of economy to general gymnastics, normal locomotion and military instruction.
7. Means of rendering attractive the methods of physical education.
8. The rôle of music, singing and dancing.
9. Establishment of courses, yards, gymnasia, playgrounds, pools, etc.; apparatus and clothing for games and gymnastics.
10. Material and technique of the laboratories for research in the effects of movements and the results of education.
11. Graphic and statistical notations of the results obtained.

SECTION IV.

Pedagogy.

1. Pedagogy ought to be based upon a knowledge of the effects of exercise upon the human body.
2. Application of the rules of education to the individual, to the family, to an academic group and to an entire population.
3. In the case of an extensive country, where the customs, language and climate are different, ought education to be uniform?
4. Ought the direction of physical education be centralized? In what measure ought one to allow local initiative to intervene in the application of general principles to particular cases?
5. Forms of physical education at different ages. Rules and precepts for mothers; differences between the education of the young woman and the young man.

   Practices calculated to preserve physical qualities in mature and old age.
6. Plan of a normal physical education:

   Nature, choice and progression of exercises.

   School programmes of different grades.

   Selection of teachers; examinations, preparatory courses of instruction, special normal schools, inspection.
7. Control of results, statistics and special pedagogical museums.
8. Establishment of higher education.

   Courses in the faculty for the students of the University.
9. Errors in systems based on specialties, in particular in systems based on movements with the hands or arms.

   Advantages of a mixed system including plays and systematic exercises.

SECTION V.

Propaganda.

1. Publications and special reviews.
2. Post-graduate works.

   Societies of sport and gymnastics.

3. Organization of competitive meetings, subsidies and rewards.
4. Means of interesting families in the work of regeneration and of introducing healthful exercises into private life.
5. Means of procuring resources for the propaganda of the work of physical education.

QUESTIONS IN THE ORDER OF THE DAY OF THE CONGRESS.

SECTION I.

Philosophy.

1.—a. Unity of plan in educational methods based on natural laws and in conformity with the human organization (sect. I, no. 5,).

2.—b. The necessity of introducing scientific method into physical education and of subordinating it to the laws of individual evolution (sect. I, no. 10).

SECTION II.

Applied Biological Sciences.

3.—a. Study of the reciprocal reactions of psychic phenomena upon the principal functions of life (sect. II, no. 2).

4.—b. Study of the form, proportions, volume and density of the body from the point of view of its adaptation to a given muscular effort (sect. II, no. 7).

5.—c. What are the relative proportions of nervous and muscular expenditure in the general production of work (sect. II, no. 9)?

6.—d. What are the laws of the economy of energy in different muscular acts (sect. II, no. 12)?

SECTION III.

Technique.

7.—a. Rules of physical education from the point of view of health, beauty, skill and the best utilization of muscular force (sect. III, no. 2).

8.—b. Means of rendering the methods of physical education attractive and of satisfying aesthetic demands (sect. III, nos. 7 and 8).

9.—c. Experimental research upon the effects and results of physical education (sect. III, nos. 10 and 11).

Section IV.

Pedagogy.

10.—a. Ought the direction of physical education to be centralized in the State? To what degree ought one to allow local initiative to intervene in the application of general principles to particular cases (sect. IV, no. 4)?

11.—b. Form of physical education in different ages (sect IV, no. 5).

12.—c. Formation of a teaching personnel; establishment of superior instruction in physical education (sect. IV, no. 8).

13.—d. Advantages of a system comprising both plays and systematic exercises (sect. IV, no. 9).

Section V.

Propaganda.

14.—a. Is there opportunity for an international review of physical education?

15.—b. Means of interesting families in the work of regeneration and of introducing healthful exercises into private life.

Important Notice.—All manuscripts must be sent before the 15th of June, 1900, to M. Georges Demeny, General Secretary, avenue de Versailles, 95, Paris.

Trans. by Rachel Kent Fitz.

EDITORIAL NOTE AND COMMENT.

The preliminary announcement of the Chicago Institute has just been received. This school is the logical successor of the Cook County Normal School, now the Chicago Normal School, since it is to be under the charge of Colonel Parker, supported very largely by the staff of teachers formerly connected with the Cook County and Chicago Normal Schools.

Probably no school in the country has been so free from the trammels of conventional education as the Cook County Normal School, under the direction of Colonel Parker. The principal restrictions imposed upon it have been due to the political aspect of its controlling bodies. Colonel Parker is therefore to be congratulated upon the fact that he will henceforth be free from political influences. He is, moreover, to have a sympathetic board of managers who will cordially support his efforts to develop what he regards as a rational scheme of elementary education.

The school is promised the financial backing necessary to expand its working force, and a building, according to the plans of the prospectus, which will adequately house its various departments. This building will face Lincoln Park near Lake Michigan, in the vicinity of the Botanical and Zoölogical Gardens of the Park as well as of the libraries and scientific institutions of the North Side. It will include laboratories for physics, chemistry, geography, domestic science, and a large and well-equipped gymnasium and natatorium.

The school is to be threefold in nature: the Academic school plans "to provide ideal conditions for the education of children and youth between the ages of four and eighteen, in order to prepare them for the duties and responsibilities of life and for higher education"; the Pedagogical school, for the training of teachers; and the Summer School of Pedagogy, which will include five weeks of instruction, thus coming into line with Harvard and other summer schools having extended courses.

It is not too much to say that the foundation of this school promises more for the cause of rational elementary education than any other recent educational movement in the country. There have been numerous experiments in founding schools, but few of them have been the result of so long a period of evolution or

have had so secure a foundation uoon successful preparatory experimentation as the Chicago Institute.

The programme of the International Congress of Physical Education is published under Official Announcements in this issue of the REVIEW. If this programme is successfully carried out, the Congress will contribute much to the advancement of physical education. The method adopted by the Congress of printing in advance the propositions offered by those who are to read papers, so that they may be studied carefully before the debate, and consequently be thoroughly treated in the Convention, possesses great advantages. The topics for discussion cover so broad a field that no one who is at all interested in any phase of physical education can possibly be without interest in the proceedings.

It is to be hoped that the suggestion that this Congress may be only preliminary to an International Commission which shall continue its work may find fruition. If there could be organized an International Committee to apportion and direct the experimental study of the problems of physical education, the amount of work necessary to be done in each coöperating laboratory would be comparatively small, but the aggregate result large. It would further devolve upon this committee to analyze and correlate the results, and either to publish or report them to a succeeding Congress.

The formation of an International Review of Physical Education is one of the most important propositions made by the Congress. So many valuable contributions to the literature of physical education are published in medical and other scientific journals, that it is impossible for a local journal properly to handle and include all of this material in its bibliography. This difficulty would not exist for an International Review, because of the representative nature of its staff. This proposition should therefore receive the hearty support of all who are interested in the advancement of physical education.

The Corresponding Secretary of the A. A. A. P. E. desires to have the addresses of those who plan to attend the Congress, that they may be mutually informed of one another's plans. Physical education has made such rapid strides in America that it is espe-

cially important that the American delegation should be a coherent body able to secure for the United States its proper recognition upon commissions, committees, etc.

Official copies of the Programme* of the International Congress of Physical Education may be obtained by writing to the Corresponding Secretary and enclosing a two-cent stamp.

As we look back over the year which has just closed, we cannot but realize that the cause of physical education has made distinct progress. The establishment of a committee for the investigation of the claims of physical education in the school curriculum by the Convention of the A. A. A. P. E. in 1899, is a long step in advance and promises much for its future recognition as a dignified branch of study in the schools. The organization of the International Congress of Physical Education at Paris and the increase in experimental studies in school hygiene and the physiology of exercises, offer further evidence of this advance.

The puzzling questions and conflicting theories which surround all considerations of physical exercise as applied to bodily development, however, still demand treatment sufficiently exhaustive to satisfy all disputants as to what is fact and what is fancy. This treatment must be the result of an experimental study of the effects of the different sorts of training and an extension of the study of the physiology of exercise into new lines. This work is so great and is so liable to be biased by personal predilection, that it seems probable that it will not be adequately accomplished under the present methods for many years to come. Has not the time arrived for coöperative investigation? The work of the Committee of Fifty in the investigation of the effects of alcohol may be taken as an object lesson of the best method of attacking this difficulty. Can we not establish a committee which will be empowered to define these problems and assign the investigations to such laboratories as are willing to coöperate for the prosecution of studies along clearly indicated lines, and under the direct control of well-trained physiologists, psychologists and physical educators? That the physiologists and psychologists are interested in these lines of investigation is evidenced by the multitude of studies now made in the direction of neuro-muscular physiology. Such coöperation would substitute for the present hap-hazard method of investigation an effective synthesis of effort which would insure a comprehensive and exhaustive result.

*Translated on Page 98.

NEWS NOTES.

Gymnastic apparatus for playgrounds of vacation schools.—"The amount of gymnastic apparatus should be increased, even at the expense of common swings. Apparatus to be especially recommended includes the balance swing, the giant stride, the tan bark pit, the buck, the parallel and horizontal bars, climbing and traveling ladders, climbing poles, and plenty of clean sand. Though such apparatus, if well made, will be expensive, it is the only resource in the spaces available. Bathing apparatus might well be included under this head."—William Noyes of Chicago, in The School Weekly, December 7, 1899.

Chicago has just established a system of medical inspection of schools, and employs fifty physicians for the purpose. In the first two days, 1,600 children were examined and 175 excluded. The cases were as follows:
Scarlet fever, 30; diphtheria, 22; measles, 41; tonsilitis, 21; chicken pox, 30; mumps, 10; sore eyes, 3; skin diseases, 13; whooping cough, 1; pediculosis, 4.—The School Weekly, Chicago, January 11, 1900.

The University of Chicago has introduced the study of human anatomy into the curriculum, and the work of dissection has begun in the University Laboratory. The course is open to both men and women, and is taken not only by students preparing for medical schools, but by students of sociology, biology, and allied sciences.

The cost of running four vacation schools in Chicago during the summer of 1899, which provided for 1,753 pupils for six weeks, was $2.93 for each pupil. This included the cost of excursions. A total of $5,950.10 was expended.

At the Ministry of Public Instruction, an attempt is being made to raise the level of physical instruction and to define its methods. A commission composed of the following eminent per-

sons, has been appointed: MM. le comte de Villeneuve, conseiller d'Etat, Merillon, avocat général, président de l'Union des sociétés de tir de France; Charles Cazalet, président de l'Union des sociétés de gymnastique; Colonel Derué; M. Demeny, etc.

One of the objects of this commission is to establish the requirement that teachers of gymnastics shall be equally competent in theory and practice. At present many of them are very poorly prepared in theory, and are consequently unable to make a judicious application of exercises or to give intelligent instruction. —(La Gymnastique Française, October, 1899.)

The following figures from the second Jahrbuch der europäischen Turnverbände, published by N. Cupérus, show the extent to which popular gymnastics has spread on the Continent of Europe:

Germany: 6,303 societies, 626,512 members, 1 member to every 90 of the population.

Switzerland: 521 societies, 35,693 members, 1 member to every 87 of the population.

Bohemia: 505 societies, 44,000 members, 1 member to every 133 of the population.

Denmark: 380 societies, 9,229 members, 1 member to every 250 of the population.

Norway: 30 societies, 4,500 members, 1 member to every 409 of the population.

Belgium: 141 societies, 13,496 members, 1 member to every 488 of the population.

Holland: 129 societies, 9,105 members, 1 member to every 550 of the population.

France: 544 societies, 66,000 members, 1 member to every 583 of the population.

Italy: 104 societies, 13,475 members, 1 member to every 2,336 of the population.

Sweden: 38 societies, 2,000 members, 1 member to every 2,481 of the population.

Hungary: 45 societies, 4,500 members, 1 member to every 3,385 of the population.

There are also societies in Russia, Roumania, and a few other countries not included in this table.—(Deutsche Turn-Zeitung, October 26, 1899.)

F. E. L.

In Boston there are three out-of-door gymnasiums open for summer use. There are also two in-door gymnasiums well furnished with gymnastic apparatus and shower baths. In the one in South Boston, 350 children exercise every Saturday and 150 every Tuesday afternoon. About 250 women are present twice a week. The total attendance is 1,700 persons, and 2,600 applications for membership have been received.

There is one Municipal Bath House with thirty sprays and three tubs for men, and eleven sprays and six tubs for women. More than 2,000 persons have taken these baths in a single day. During the month of January, 1899, 11,426 men and boys, and 5,621 women and girls made use of them, and in April, 1899, these numbers were increased to 18,172 and 8,331 respectively.

The Paul Revere school is fitted with shower baths and 150 children bathe there daily.

During the summer, the city has in operation 7 beach tubs, 13 floating baths, 2 river baths and 2 swimming pools. In 1898 these baths were used by 1,920,368 persons. There were eleven instructors of swimming, by whom 3,884 children were taught to swim. In 1899 there were no swimming instructors and the number of bathers was considerably less than that of the previous year.—(From Mr. H. Nissen's Report to the Boston Physical Education Society, January 11th, 1900.)

A leading feature at this season's Architectural League Exhibit in New York was the plans for the University of California, for which Henry Bénard, the French architect, won the prize of $10,000 offered by Mrs. Phoebe Hearst. The central and most important building of the group is the gymnasium, a superb structure which, with its surrounding athletic fields, is strongly suggestive of the glory of Greece and the splendor of Rome. Provision for the erection of the building has not yet been made.

ABSTRACTS.

ADVANTAGE OF ATHLETICS.

"In the transition from school to college, continuity of the best influence, mental and moral, is the thing most needful. Oddly enough, the only continuity worthy of the name is often (in its outward aspects) neither mental nor moral, but athletic. Palpably bad as the management of college athletics has been and is, misleading as the predominance of athletics in an institution of learning may be, the fact remains that in athletics lies a saving power and that for many a boy no better bridge of the gap between school and college has yet been found than the bridge afforded by athletics. Foot-ball begins with or before the college year. Training for football means early hours, clean life, constant occupation for body and mind. Breach of training means ostracism. That this game tides many a freshman over a great danger, by keeping him healthily occupied, I have come firmly to believe, It supplies what President Eliot calls 'a new and effective motive for resisting all sins which weaken or corrupt the body;' it appeals to ambition and to self-restraint; it gives to crude youth a task in which crude youth can attain finish and skill, can feel the power that comes of surmounting tremendous obstacles and of recognition for surmounting them; moreover, like war, it affords an outlet for the reckless courage of young manhood—the same reckless courage that in idle days drives young men headlong into vice."—Dean Briggs, Harvard University, in Atlantic Monthly, March, 1900.

OVERWORK IN THE SCHOOLS.*

H. KEMP.

The report presented to the College by the Commission for the Revision of the Programme of Gymnastics in primary schools, establishes the fact that the physiological processes of muscular

*"Du soir" (daily newspaper) Brussels.

activity are similar to those of intellectual activity. Gymnastics cannot, therefore, be considered as a remedy for the effects of cerebral overwork. Taking as a criterion the formula of Dr. Lunier, "Up to the age of twelve the number of hours of intellectual work ought not to exceed the number given to bodily exercises," the report shows by graphic calculations that overwork should not be produced in the schools of Brussels. Unfortunately this demonstration has too slight a foundation.

It may be questioned whether Dr. Lunier has established beyond reasonable doubt the proposition that until the age of twelve, intellectual work may without danger absorb even half of the child's vital energy. If it is remembered that the child is in a period of active growth and that its thought-processes are dependent upon its general organic state, it will be readily recognized that during infancy and adolescence the physical ought to have precedence over the intellectual. Spencer is our authority for the statement that, since in infancy, childhood and the first period of youth, vitality is so completely employed for growth that little remains for physical and mental activity, growth is demonstrated to be in infancy and youth the dominating end to which all others should be subordinated. As a matter of fact, however, school exercises, lessons and duties occupy boys of twelve in the schools of Brussels thirty-eight and one-half hours a week. When deduction is made for the time given to sleeping and eating, it is found that these children have at their command thirty-eight hours of leisure weekly. It is interesting to examine the manner in which these leisure hours, devoted presumably to bodily recreation, are passed. To wash and to dress in the morning, to go to and from school four times a day, to assist their parents, to aid sometimes even in their parents' professional occupations, to read the books borrowed from public libraries, and, in numerous cases, to frequent evening courses at the Academy, is the regular programme. Some especially favored children play in the street an hour or two each day. Others to whom the street is forbidden, find recreation in a room or kitchen. But few indulge in exercises which exert a favorable influence upon their physical development. If a child is asked when and where he plays, he answers in a way which reflects upon our educational system, "I do not play."

To conclude that pupils are not overworked because thirty-eight and one-half hours of school work are counterbalanced by thirty-eight hours of pretended leisure is to fall into a serious

error. To hope to establish an equilibrium between the child's intellectual and physical activities by means of the time passed outside of school, is a mistake. It is in the régime of the school itself that this equilibrium should exist and perhaps it is this which Dr. Lunier meant to say.

Contrary to the intention of the report, manual labor must be classed among the intellectual studies. To analyze a model, to trace a draft, to work it out to given dimensions, are exercises which necessitate continued attention and incessant reasoning. The fact that cardboard or paper must be cut, or that clay must be moulded, does not prevent these exercises from occupying the brain much more than the muscles. By including, therefore, manual labor, the school curriculum provides for twenty-seven and three-quarters hours of intellectual and five and three-quarters hours of physical exercise (gymnastics, recreation). This enormous difference ought to produce overwork. Children of six to fourteen years of age, occupied with mental work from 8.30 to 11.30 a.m. and from 1.45 to 4 p.m., are overworked and the effects of this overwork are repeated and accumulated during five days each week and during forty weeks each year. Thus atrophy and weakness in the children are assured. Those who wish to understand this régime must try to live a child's day from the child's standpoint, since the school is made for children and not for men. Not until mites of three or four years of age are out of doors or in play rooms, not until the ordinary curriculum of primary schools consists of intellectual work in the morning and bodily exercises in the afternoon, will our system of education be based upon the well-understood foundations of physiology. When physical education is given the place to which it is entitled, a new race of vigorous health and well developed physical power will be produced.—Trans. and abstr. by Rachel Kent Fitz.

AN ASSOCIATION FOR CHILD-STUDY.

(Die Kinderfehler, January, 1900, p. 4.)

It is an unfortunate though indisputable fact that, through failure to understand the physical and psychic processes in the growth and development of children, the educational methods of

the home as well as of schools and academies are frequently prejudicial both to the individual and to the community.

It is commonly agreed that pedagogy and its auxiliary sciences need a broader and surer foundation in order to become a thoroughly reliable guide in practical education.

In education, physical evolution is often neglected and bodily health impaired because psychological conditions are imperfectly known and the demands of health insufficiently considered.

Because of failure to understand pathological conditions in the body, errors are made in the case of weak or sick children in the school and home life, of sufficient magnitude to jeopardize their entire future. The educator need not be a physician, but he must know when to call in the help of a physician, or at least, when to decrease the educational as well as the physical demands made upon the child.

The fact that a decrease in physical strength causes mental deterioration is too often overlooked. Only in a healthy body and especially in a healthy nervous system can a healthy soul live. Education is, therefore, closely allied to the normal evolution and functioning of the bodily organs.

Without a knowledge of the physiology of the body, a reliable empirical psychology as the ground work for pedagogy, cannot be obtained.

From an educational point of view, it is, moreover, of the greatest importance that the educator should be in a position to observe, interpret and utilize the manifestations of the psychic life of his children. To enable him to do this, a knowledge of ordinary psychology is not sufficient in that it has not considered sufficiently long or thoroughly the physiological conditions of the psychic ego. The psychic and physical life of the child is to be distinguished from that of the adult: in the latter everything is unfolded, mature; in the former, it is in process of development. In addition to a general psychology, therefore, we need a psychology of the child, a science of the developing mind, of the genesis of the psychic life, which might well be named genetic psychology. Genetic psychology though of the greatest importance to pedagogy has hitherto been neglected.

The spiritual failings of children constitute the most difficult problems in instruction and education. They cause parents, teachers and ministers the greatest anxiety. They propound to educational thinkers the most difficult riddles. They lead to the most important educational mistakes. They demand psycho-

logical investigation. It is, therefore, incumbent upon us to study the failings of individual children and to strive for a scientific pedagogical pathology in connection with the medico-psycho-pathology of childhood. Such a development would mean much to practical theology, sociology and medicine. To Professor Ludwig Strümpel is due the credit of having already done valuable work in this field.

Medicine, including psychiatry, has, by its inquiry into the characteristics of the child, already won for itself great praise. Physicians have endeavored to influence the child's physical and moral education in accordance with the demands of physiology. Medical science will therefore remain for a long time an important source of knowledge for pedagogy, especially as its possession of numerous endowed chairs at all the universities makes a scientific treatment of educational problems possible. Pedagogy, on the contrary, in the absence of such opportunities, must depend upon personal initiative.

The above-mentioned sciences and professions, which should have such an important influence upon education and health, but which are ordinarily either indifferent or even antagonistic toward one another, will, by coöperation, not only contribute to the health of the pupil, but bridge over the gaps in the life of our people which scientific egotism repeatedly threatens to cause. This will lead to a protection of our public instruction from the one-sidedness of the school inspector and bureaucrat.

Such or similar considerations caused a large number of teachers who in 1898 had come together at a vacation school in Jena for the common study of pedagogy and its allied sciences, to formulate plans for a general association whose object should be the study of the characteristics of children. The following propositions were formulated:

(First), The association shall arrange that during the annual fourteen days' educational session for teachers, the number of papers formerly read concerning the above branches of knowledge shall be increased.

(Second), Every year a gathering for the common consideration of these subjects shall take place until further notice directly before the beginning of the vacation school for teachers and at the close of the vacation course for physicians.

This meeting shall be held in Jena, which lies in the heart of Germany, and is therefore easily reached from all sides. It is, moreover, the only university of Germany which possesses a specially endowed chair of pedagogy with a special practice

school as a field for experiment. Here the numerous vacation courses in pedagogy, physiology, psychology, school hygiene, pedagogical pathology, etc. will form the desired nucleus of interested persons. Here also are published the paper edited by Trüper, Koch, Ufer and Zimmer in the interests of pedagogical pathology called "Die Kinderfehler," the collection of longer articles edited by Ufer, Koch and Trüper, entitled "Contributions to Child Study," and the collection of articles concerning "Pedagogical Psychology and Physiology," edited by Ziehen and Schiller. These papers have already collected a large community of collaborators and readers from all professions. ("Die Kinderfehler" alone has about 1000 subscribers.) Jena, therefore, is already a focus for these studies. The association shall include all German-speaking persons who are interested in child-study.

As an organ of the association, "Die Kinderfehler," which is already in its fifth year, shall serve under the amplified title, "Die Kinderfehler, Zeitschrift für Kinderforschung mit besonderer Berücksichtigung der pädagogischen Pathologie." (Verlag von Hermann Beyer & Söhne, in Langensalza. Jährlich 6 Hefte von je 3 Bogen. Preis 4 Mark).

The point of departure for the studies made shall be the study of the deficiencies of children. In the meetings, however, the psychology and physiology of the normal, in so far as the latter concerns psychology, shall be considered also.

The first meeting was held on the 31st of July and the 1st of August, 1899. Seyfert has given an account of the proceedings in an article entitled "Deutsche Schulpraxis" which appeared in Numbers 5 and 6 of "Die Kinderfehler." Reprints may be obtained from the publishers (Beyer & Söhne in Langensalza) as well as through any book store, for twenty pfennigs (five cents).

At the present time the Association has not considered a closer organization than that outlined above, because the teachers who are mainly responsible for its organization wish to obtain a larger following among other scientific and professional men, that at the outset its constituency may command the greatest respect. In accordance with a resolution passed by the association, its committee will apportion two years' work for general investigation in the fields of pedagogical psychology and of general genetic psychology.

A list of members is given in Number 1 of "Die Kinderfehler."

The business affairs of the Association have been entrusted to Mr. J. Trüper, director of the Educational Home for Abnormal

Children at Sophienhöhe bei Jena. He has charge also of all applications for membership, announcements of lectures and correspondence.

The preliminary announcement of committees is as follows:—

For the local committee in Jena:—

Hofrat Dr. O. Binswanger, Professor der Psychiatrie und Direktor der psychiatrischen Klinik.

Geh. Hofrat Dr. med. Gärtner, Professor der Hygiene.

Fr. Lehmensieck, Oberlehrer am Pädag. Universitätsseminar.

Dr. phil. W. Rein, Professor der Pädagogik und Direktor des Pädagogischen Universitätsseminars, Mitherausgeber der "Zeitschrift für Philosophie und Pädagogik."

Trüper, Direktor des Erziehungsheimes Sophienhöhe.

Dr. med. Ziehen, Professor der Neuropathologie und Psychiatrie.

For the general committee:—

Schulrat Dr. Andreä, Seminardirektor in Kaiserslautern.

Dr. med. A. Baginsky, a. o. Professor der Kinderheilkunde an der Universität Berlin und Direktor des Kaiser und Kaiserin Friedrich Kinderkrankenhauses in Berlin.

Sanitätsrat Dr. med. Berkhan in Braunschweig.

P. Conrad, Seminardirektor in Chur. i. d. Schweiz.

Prof. Dr. A. Cramer in Göttingen.

O. Danger, Direktor der Taubstummenanstalt in Emden.

J. Delitsch, Leiter der Schule für minderbegabte Kinder in Plauen.

Geh. Staatsrat Dr. phil. J. Drbohlav, Gymnasialdirektor in Tiflis in Russland.

Dr. H. Ebbinghaus, Professor der Psychologie in Breslau und Herausgeber der "Zeitschrift für Psychologie und Physiologie der Sinnesorgane."

Geh. Medizinalrat Dr. A. Eulenburg, Professor der Nervenheilkunde und Herausgeber der "Deutschen Medizinischen Wochenschrift," Berlin.

O. Flügel, Pastor in Wansleben bei Halle, Mitherausgeber der "Zeitschrift für Philosophie und Pädagogik."

Hauptlehrer H. Kielhorn, II. Vors. des Verbandes der deutschen Hilfsschulen, in Braunschweig.

Dr. J. L. A. Koch, Irrenanstaltsdirektor a. D. in Cannstatt.

Dr. med. J. P. Möbius in Leipzig.

Dr. med. C. Schmid-Monnard, Kinderarzt in Halle.

Dr. med. Julius Moses in Mannheim.

Geh. Med.-Rat Prof. Dr. Pelman in Bonn.

A. Rienks, Seminardirektor in Enschede in Holland.

R. Seyfert, Schuldirektor in Olsnitz. Herausgeber der "Deutschen Schulpraxis."

Dr. Sickinger, Stadtschulrat in Mannheim.

Prof. Dr. M. Simon, Direktor der Klinger-Oberrealschule und des pädagogischen Seminars in Frankfurt e. g. a-M.

Dr. phil. A. Spitzner, Bürgerschullehrer in Leipzig.

Dr. F. A. Steglich, Bürgerschullehrer in Dresden, 1. Vorsitzender der "Freien Vereinigung für philos. Pädagogik."

Chr. Ufer, Rektor in Altenburg.

Dr. phil. F. M. Wendt, k. k. Professor am Lehrer—und Lehrerinnen-Seminar in Troppau.

Prof. Dr. theol. et. phil. Zimmer, Direktor des Evangelischen Diakonievereins in Zehlendorf bei Berlin.

(Trans. and abst. by Rachel Kent Fitz.)

Gymnastique sans appareils.—Dr. Laburthe. Imprimerie Daix, Clermont (Oise), 1899.

"In our days, among the bourgeois classes, many men and women are especially deformed by ventri-potence, or rather by ventri-impotence, which is recognized as the cause of many maladies or diatheses. Dr. Laburthe is a strong advocate of gymnastics as a remedy. He discusses the relative values of German gymnastics, formerly the fashion, and of Swedish gymnastics, the only one now actually in favor, but decides in favor of French gymnastics.

He recalls the fact that gymnastics was born on French soil, as Rabelais' descriptions show, and that thanks to our exercises, the knights of former times acquired sufficient force to conquer and dominate everywhere. Through personal use of all the classical gymnastic apparatus, Dr. Laburthe is fully competent to judge of their advantages and disadvantages.

His purpose, however, in this book is simply to present a method of exercises without apparatus, borrowed from the plays which amuse children, which shall enable one to carry on gymnastics in a room with open windows, in a garden or on the lawn with wife and children. The expenditure of one or two hours daily in exercise of this sort will, he believes, result in greatly improved health. DR. A. CHARLIER.

(Trans. and abstr. by R. K. F.)

BOOK NOTICES AND BIBLIOGRAPHY.

School Hygiene, by Ludwig Kotelmann, Ph.D., M.D., Translation from a specially revised copy by J. A. Bergström, Ph.D. and Edward Conradi, M.A., Indiana University. C. W. Bardeen, Syracuse, 1899. Pages 391. Illustrations, $1.50.

The book opens with a brief history of school hygiene in Germany, and a partial bibliography. The following subjects are treated in separate chapters: Orientation and Natural Lighting, Artificial Illumination, Ventilation and Cleaning, Heating, School Furniture, The Nervous System, School Programmes, The Eye, The Ear, The Vocal Organs, Curvature of The Spine, and Infectious Diseases. There are also a bibliography of English and American Books and Papers on School Hygiene and an Index.

The topics are discussed from the modern scientific standpoint and show thoroughness of preparation. Throughout, the emphasis is put upon the necessity of furnishing school children with the conditions most favorable to their physical and intellectual development. The child is constantly kept in mind as the essential point of departure for all discussions of school conditions. Naturally the subject of fatigue in school has been made prominent and much of the later work finds analysis in Kotelmann's pages. Both the methods and results of fatigue-study are fairly well outlined. The text references to bibliography are sufficiently complete for most purposes, and suggest a valuable course of reading for students of school hygiene, although they are limited to foreign sources.

Appended to the book is a bibliography of thirty pages of English and American books and papers on school hygiene collected by the translators and partially supplied with critical notes. This bibliography is, however, somewhat narrowly selected and shows dependence on pedagogical and popular publications.

As a whole the book is so good that one regrets that the mechanical execution is not of a higher grade.

G. W. F.

The Physical Nature of the Child and How to Study it, by Stuart H. Rowe, Ph.D., Supervising Principal of the Lovell District, New Haven, Conn.; formerly Professor of Pedagogy and Director of Practice in the State Normal School at Mankato, Minnesota. New York. The Macmillan Co., 1899. Pages xiv, 207.

The table of contents is as follows: Chapter I, Introduction; II, Sight; III, Hearing; IV, Touch, Taste, Smell, Muscular Sense, Temperature Sense; V, Motor Ability; VI, Enunciation; VII, Nervousness; VIII, Fatigue; IX, Disease; X, Habits of Posture; XI, Habits of Movement; XII, Growth and Adolescence; XIII, School Conditions affecting the Child's Physical Nature; XIV, Home Conditions affecting the Child's Physical Nature; Bibliography (of nine pages, containing 105 titles); and Index.

The author's aim is to convince the teacher that he does not have the exact knowledge necessary for the adequate care of the physical well-being of his pupils, and to furnish him with this. He has culled from the literature of the subject with a fair degree of thoroughness, selecting what appealed to him as of practical value. oughness, selecting what appealed to him as of practical value. He has, however, overlooked important articles which have appeared in medical and special publications.

In many instances, the style is unfortunately discursive and unfits the book for quick reference. A larger use of summaries and tables, and the insertion of illustrations would have added greatly to the value of the book. On the whole, however, the book is a praiseworthy effort to correlate the various lines of child study which have been developed during recent years, and to shape them into a practical series.

G. W. F.

Massage and the Original Swedish Movements. Their Application to Various Diseases of the Body, by Kurre W. Ostrom. Fourth Edition, Revised and Enlarged with 105 illustrations. Philadelphia, P. Blakiston's Son & co., 1899. Pages viii, 168, $1.00.

Mr. Ostrom has attempted to simplify the practice of massage and Swedish movements, and to illustrate these so clearly that nurses and students may easily grasp them. In this he has been eminently successful. The illustrations are frequent and adequate; the descriptions of manipulations and movements and the directions for the application of massage and Swedish move-

ments to diseases are clear and concise. This brevity in conjunction with the omission of any discussion of the diseases *per se* may, however, lead to over-confidence on the part of students or inexperienced manipulators who depend upon the book for their massage training. The explanations of movements show dependence upon the special Swedish physiology, as for instance, after describing rotation (circumduction?) of the leg, the author states that the movement is used to "regulate the circulation of the abdominal organs and to prevent stiffness in the hip joint." After directions for rotation (circumduction?) of the pelvis, the following note is also given: "The aim of the rotation is to lengthen and shorten the veins, so as to produce a sucking of their contents, thus stimulating the circulation and assisting the heart in its action." That this sort of physiology still remains in the literature of Swedish gymnastics is difficult of explanation.

G. W. F.

Treatise on Orthopedic Surgery, by Edward H. Bradford, M.D. and R. W. Lovett, M.D. Illustrated by 621 engravings. Second revised edition. Wm. Wood & Co., New York. Pages 655.

This new edition of the authors' well-known Treatise on Orthopedic Surgery will be welcomed by all who are interested in the correction of bodily deformity. The book has been largely rewritten as well as enriched by newer and more pertinent illustrations. The sixty-two pages devoted to lateral curvature of the spine are so excellent that it seems a pity that they cannot be printed as a special book for the benefit of those interested in physical training. The suggestions for exercise should certainly be in the hands of all who are attempting to influence curvature cases by its means. The illustrations of bony change, methods of recording deforming postures, etc., are specially helpful. Those interested in physical training will find the discussion of the mechanics of the foot in relation to flat foot and other affections of the foot, also of great value.

G. W. F.

Report of the Commissioner of Education for the year 1897-98. Two vols. Pages cxx, 2640. Numerous tables and illustrations. Government Printing Office, Washington, D. C., 1899.

The first 61 pages contain the specially summarized report of Commissioner Harris, which is of great interest in that it gives a

succinct review of the educational progress and tendencies of the past year.

Among the chapters of special interest are Chapter VII, Means for Spreading Hygienic Knowledge among the People, by Leo Burgerstein, covering 12 pages; Chapter XII,* containing Dr. Hartwell's contribution to physical training, 103 pages in length with three illustrations (this is a condensed sketch of the theory and history of physical education and combines the circular on physical training (Circular No. 5, 1885) with Dr. Hartwell's other papers and reports); Chapter XXI, Experimental Study of Children, including Anthropometrical and Psychophysical Measurements of Washington School Children, by Dr. Arthur MacDonald, 216 pages in length. (Dr. MacDonald details studies and measurements made upon white and colored children, normal and abnormal in the Washington schools. He summarizes also the anthropometrical measurements made elsewhere in the United States and in Europe, and adds an extended and well-illustrated list of psychophysical instruments of precision which he has collected together in the laboratory of the Bureau of Education); Chapter XXV, Child Study in the United States, also by Dr. MacDonald, 110 pages in length, containing a bibliography of 34 pages and a copious index close the chapter.

Under Miscellaneous Educational Topics, Chapter XXXVII, is a translation of a paper of 6 pages on Athletic Gymnastics by Professor Angelo Mosso of Turin, Italy, taken from "The Physical Education of the Young."

The subsequent chapters are devoted to the Report of the Committee of Twelve of the Modern Language Association of America, University Types and Ideals, Methods of Instruction in Agriculture, etc.

The Report of the Commissioner of Education can be had upon application to the Department of Education, Washington, D. C.

G. W. F.

MONATSSCHRIFT FÜR DAS TURNWESEN. Berlin. 1899. Vol. XVIII.

No 11 (November). Thoughts on Gymnastic Instruction in Country Schools, Alfred Böttcher. Report on the Introduction of Free Instruction in Swimming among Poor Children in the Dresden Schools during the Summer of 1899 (concluded from No. 10). Reports of Meetings of the Turnlehrervereine (societies of teachers of gymnastics) in the province of Saxony,

*This can be obtained as a reprint by application to the Corresponding Secretary of the A. A. A. P. E.

the kingdom of Saxony, northwest Germany, and Württemberg. The Sessions of the Central Committee for the Promotion of Popular and Youthful Sports (in Eisenach, October 4 and 5).

No 12 (December). German and English Games, Albert Siebert. Book reviews, announcements, reports of meetings, miscellaneous items, contents of current Continental periodicals devoted to physical training, book notices, etc.

Vol. XIX (1900).

No. 1 (January). A Review of Gymnastics in the Nineteenth Century, by Carl Euler (to be continued). Reform in School Hygiene, by H. Schröer.

F. E. L.

DEUTSCHE TURN-ZEITUNG. Leipsic, 1899. Vol. XLIV.

No. 46 (November 16). The German and English Dreisprung (hop-step-and-jump), and English Words in German Works on Gymnastics: a Plea for what is German, even in Gymnastic Terminology, by Dr. Karl Wassmannsdorff (concluded in No. 47). Groups of Exercises on the Horizontal Bar, P. Hentzschel. Annual reports, reports of gymnastic festivals, news items, miscellany, announcements, correspondence, etc., as usual.

No. 47 (November 23). From the Album of the Jahn Monument in the Hasenheide, Erich Hammer. A Wand Reigen, P. K. Wendler.

No. 48 (November 30). Glimpses of the History of Gymnastics—VIII: Swimming and Bathing, Skating, Dancing and Ball Games, by A. Thoma (concluded. See No. 38). How Small Societies May Go to Work to Secure their Own Grounds and Halls for Gymnastic Exercises, Fr. N gele. Some Free Exercises for Women, H. Munier. Exercises with the Iron Wand, K. Mothes.

No. 49 (December 7). The Year 1898 in the Life of the German Turnerschaft, by Dr. R. Gasch (continued in Nos. 50 and 51). The Social and Climatic Conditions of the Fatherland and the Management of Gymnastics, W. Auerbach. The Celebration of the New Century (the 19th) at Schnepfenthal as Described by Guts-Muth, Dr. Karl Wassmannsdorff. Graded Groups of Exercises on the Horizontal Bar, Parallel Bars, and Horse, arranged by F. M. Misselwitz.

No. 50 (December 14). Some Uncommon and Comparatively New Gymnastic Exercises, Dr. Karl Wassmannsdorff. The

General Free Exercises, Exercises in Fencing with Foils, and Exercises on Four Bars Performed at a Celebration in Honor of Dr. J. C. Lion at Leipsic on March 12.

No. 51 (December 21). An Excursion by the Turnverein in Neisse, Paul Ehrlich. Games and Bodily Exercises in German Manuscripts, and a Look at School Gymnastics in Germany since the Sixteenth Century, by Dr. Karl Wassmannsdorff. Graded Groups of Exercises with Indian Clubs, on the Horse and on the Parallel Bars, by P. Hentzschel.

No. 52 (December 28). Vaulting-Poles of Wood and Steel, by C. W. Four Groups of Exhibition Exercises with Indian Clubs, arranged by Franz Jacob. Gymnastics and Bicycling, Bernhard Striegler.

Vol. XLV (1900).

No. 1 (January 4). New Year's Greeting, Ferd. Goetz. The Palaestra Albertina in Königsberg i. Pr., Dr. Noske (continued in No. 3). Julius Hoppe, by Otto Atzrott. How and When Shall Gymnastics be Practiced in the School, Dr. Fr. Dornblüth. Exercises for Use in Marching on and off the Floor, by W. Walz. Free Exercises, Exercises on the Horizontal Bar and on the Parallel Bars, by Rud. Witzgall. Literature of German Gymnastics and Games from July 1st to December 31st, 1899, by Ferd. Goetz.

No. 2 (January 11). Goethe's Bodily Vigor and His Fondness for Physical Exercise, by Jaro Pawel (continued in Nos. 3 and 5). A Wand Reigen for Women, by Th. Hellwig. Groups of Exercises on the Horse, by C. Wehner. The Belgian Gymnastic Festival in Ghent (July 15-17), by Dr. Hahn. Honorary Members in Turnvereine, by Dan Kappel.

No. 3 (January 18). Groups of Exercises on the Parallel Bars, the Flying Rings, the Horizontal Bar, and with Long Wands. Modern Wrestling Contests, with Special Reference to the Contests for the World's Championship in Paris, by Otto Wedler (concluded in No. 4). A List of Changes in the Societies of the German Turnerschaft, by Dr. Rühl.

No. 4 (January 25). Men of Middle Age in the Turnverine, Bruno Sauerbier. Life Memories, Carl Euler (continued from Vol. XVIV, Nos. 18, 19 and 22). Exercises with Wands, M. Hirt. Exercises on the Horse Placed Sideways, Dan Kappel. Report on the Finances of the German Turnerschaft for 1899.

No. 5 (February 1). Striving for the Good of the Whole, Nawroth. A Reigen in Running Step, Rudolf Reinhold. Groups of Exercises on Flying Rings and Parallel Bars, Flying Rings and Horizontal Bar, Horizontal Ladder and Parallel Bars, by Rudolf Reinhold. The Importance of Courses for Squad-Leaders (Vorturner), R. Gräber.

F. E. L.

MIND & BODY, MILWAUKEE, WIS.

December, 1899: The Necessity of a Uniform Terminology in Physical Training, by Hermann O. Dreisel; Dynamics of School Puberty, by M. H. Hatfield, M.D.; Physical Development in America; Gymnastics in the Denver Fire and Police Department; Treatment of Obesity; Need of Public Playground; Widener Industrial Home for Crippled Children; Plan for a Model Athletic Ground; Quadrennial Festival of the N. A. G. U.

January, 1900: Free Municipal Baths in Boston, by Wm. I. Cole; The Locker Room of the Rhode Island Normal School; Conditions and Needs of Physical Education, G. W. Fitz; The First Boston Gymnasium; Physical Training *versus* Games; World's Best Records.

THE PEDAGOGICAL SEMINARY, WORCESTER, MASS.

December, 1899: The Psychology of Ownership, by Linus W. Kline and C. J. France; The "Child Type," by Alexander F. Chamberlain; Note on Early Memories, by G. Stanley Hall; An Educational Experiment, by George E. Johnson; A Study of Children's Reading Tastes, by Clara Vostrovsky; Foundations of Nature Study, by C. F. Hodge.

THE DIETETIC & HYGIENIC GAZETTE, NEW YORK, N. Y.

January, 1900: Deep breathing is vital; Municipal Gymnasiums; Athletics in Their Relation to the Male Genito-Urinary Organs, by G. Frank Lydston, M.D.; Lung Gymnastics, by Albert Abrams, M.D.; Athletics and Patriotism; The Great Danger in Pushing Muscle Power to the Extreme, by Dr. Arabella Kenealy, Answered by Dr. Harriette C. Keatinge; Winter Clothing; The Grape Cure.

February: The Physiological Effects of Alcohol; Physical and Moral Education; Conditions and Needs of Physical Education, G. W. Fitz; Women and Exercise; The Mystery of Sleep.

THE POSSE GYMNASIUM JOURNAL, BOSTON, MASS.

January, 1900: Medical Gymnastics, Baron Nils Posse; The Motor Element in Education, Harriet A. Marsh; Professor Mün-

sterberg on Psychology; Intercollegiate Gymnastics, Charles M. Williams; Physical Training for the Blind, M. Pamelia Clough; The Lymphatic System, Grace Mott Boswell.

THE CHILD STUDY MONTHTY, CHICAGO, ILL.

January, 1900: Chicago Vacation Schools; The Parent as a Factor in Mental Development, Edward Thorndike; Child Study —Its Importance to the Home, J. F. Saylor; On the Respect due to Little Children, Julie Caroline O'Hara; The Effect of Tobacco on The Development of the Young; Youth-Study in the High School, Charles B. Gilbert.

February: Chicago School Banks (Chicago News).

THE JOURNAL OF PEDAGOGY, SYRACUSE, N. Y.

December, 1899: The Conservation of Mental Energy, by M. V. O'Shea; The Development of the Social Aim in Education, by I. W. Howerth.

REVUE INTERNATIONALE DE PEDAGOGIE COMPARATIVE, NANTES, FRANCE.

December, 1899: Schools for the Blind in Russia, by Antonina de Tchernitsky.

DIE KINDERFEHLER, LANGENSALZA, GERMANY.

November, 1899: The Pathology of Childish Timidity, by Dr. Julius Moses, Mannheim, Germany; The Study of Defective Children in America, by W. S. Munroe, State Normal School, Westfield, Mass.; The Shortsightedness of Our Children, by Prof. Herm. Cohn (the result of the study of 52,159 children).

January, 1900: The Evolution of the Child's Soul, by Ufer,

EDUCATIONAL REVIEW, NEW YORK, N. Y.

February, 1900: School Deportment and The Weather, by Edwin G. Dexter, State Normal School, Greeley, Colo.

March: Training Individuality in College, by H. de F. Smith, Bowdoin College, Brunswick, Me.

EDUCATION, BOSTON, MASS.

February, 1900: The Early Education of Girls in Massachusetts, by Geo. H. Martin, Lynn, Mass.

March: The Life and Work of Brown-Sequard, by Mrs. W. D. Cabell, Norwood, Va.

Athletics in Public Schools, by J. Gardner Smith, New York, N. Y. New York Medical Journal, February 10, 1900, Vol. LXXI, No. 6.

Physical Fitness of Railway Employees as Viewed from the Operating Department, by R. C. Richards, Esq., Chicago. Inter. Journal of Surgery, February, 1900, Vol. XIII, No. 2.

Psychology and Heredity, by Robert MacDougall, Ph.D., Cambridge, Mass. Boston Medical & Surgical Journal, February 22nd and March 1st, 1900, Vol. CXLII, Nos. 8 and 9.

The Conservation of Mental Energy, by Professor M. V. O'Shea, University of Wisconsin, Madison, Wis. Journal of Pedagogy, December, 1899, Vol. XII, No. 3.

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Militarism, or Military Fever; Its Causes, Dangers and Cure, by R. H. Thomas, M.D., Baltimore, Md. The American Freidenker Publishing Company, 1899.

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Journal of the Massachusetts Association of Boards of Health. Boston. Small, Maynard & Co., Volume IX., No. 4, January, 1900.

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THE PHYSIOLOGICAL SIGNIFICANCE OF THE FLOW OF LYMPH AND ITS RELATIONS TO MUSCULAR EXERCISE.

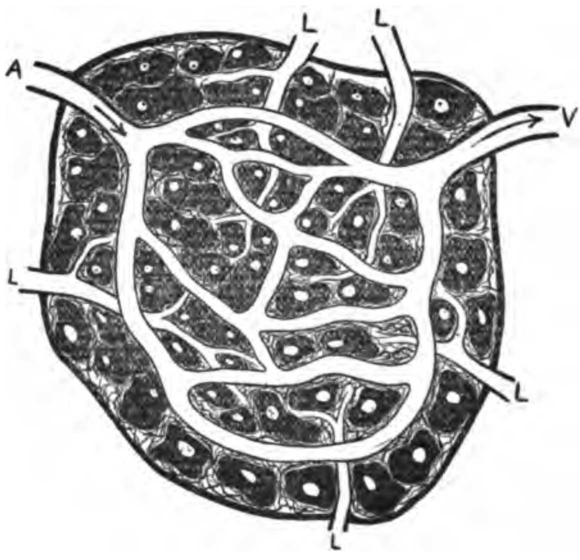
THEODORE HOUGH, PH.D.,
Boston.

THE lymphatic system, as is well known, consists of the lymphatics which in turn take their origin from several kinds of spaces; among these may be mentioned the lacteal radicles of the intestine, the serous cavities of the body, and the interstitial connective tissue of the organs. In the present paper we are especially interested in the relation of the lymphatics and the lymph flow to the spaces of this interstitial tissue and to the functional activity of the organs themselves.

It is not necessary to go into details with regard to the anatomy and histology of the structures with which we are concerned. It may be well, however, to recall the typical relations to one another of blood vessels, lymphatics, interstitial connective tissue and the specialized cells of the organs. These are shown in the figure, which is a diagrammatic representation of these relations. Surrounding the entire organ is its capsule or covering of connective tissue represented in the heavy black line; this, of course, would correspond to the perimysium of muscle, the pia mater of the brain, the epineurium of a nerve, or the capsule of a kidney or liver. The rest of the organ is represented as composed (1) of its cells, in each of which the cytoplasm and nucleus are shown;

(2) of the fibres of the interstitial connective tissue; (3) of the blood vessels, consisting of an artery, anastomosing capillaries, and an efferent vein, the whole forming a closed system; and (4) five lymphatics which are seen to arise in the connective tissue of the organ and to pass through the capsule, their further course not being indicated.

Between the fibres of the connective tissue are numerous spaces which are filled with lymph. Histologists are divided upon the



question whether the lymph spaces of connective tissue are in direct communication with the lymphatics; they are certainly in free communication with one another; but whether the lymphatics end freely in these spaces, as represented in the figure, or whether they are separated from them by a single layer of epithelial cells is the disputed point, with the balance of evidence, perhaps, in favor of the former view. For our present purposes, this is a matter of small importance, since there can be no doubt that the lymph of the interstitial spaces passes into the lymphatics and, in fact, is the source of the lymph flow which is constantly taking place from every organ of the body.

On leaving the organ, the lymphatics unite with one another in much the same manner as the veins, smaller trunks coming

together to form larger ones; all ultimately open into the great veins near the heart. They closely resemble the veins in structure and are provided with numerous valves. It will be remembered, moreover, that most of them take their origin in organs and tissues outside of the thorax and that the two final trunks are situated within the thoracic cavity immediately before emptying into the venous system.

There is a constant current of lymph from the interstitial tissue of the organs through the lymphatics to the veins. This is known as the flow of lymph, and differs from the flow of blood in that the lymphatics end blindly; consequently the lymph flow is always away from the organ, and there can be no such thing as a circulation of lymph in the sense that there is a circulation of blood. As the lymph is removed from an organ by the lymphatics new lymph is formed in the tissue spaces, partly from the blood and partly from the cells. It is with the physiological significance of this lymph flow that this paper is concerned.

The amount of lymph which normally flows from an organ is, of course, small compared with the amount of blood which passes through it. When we remember that the blood makes the complete circuit of the circulation in from twenty to thirty seconds, it is evident that large quantities of blood must pass through an organ in the course of a day. It is exceedingly difficult, on the other hand, to measure the amount of lymph which flows away from an organ in a given time; the lymphatics are not easily accessible to operative interference and our estimates on this point must be regarded as provisional; it has been calculated, however, that the total amount of lymph which returns to the large veins within twenty-four hours is approximately equal to the total volume of blood in the body. There can be little doubt, moreover, that the amount of lymph leaving an organ varies greatly under different conditions, and is especially influenced by the activity of the organ; the lymph flow from a working muscle, for example, has been observed to be five or six times that of a resting muscle. At its best, however, the lymph flow must be quite slow and the total amount leaving any particular organ comparatively small.

There is no trouble in understanding the physiological significance of the lymph within the interstitial spaces; it furnishes the immediate environment of the living cell. This means that it must contain the food supply of the cell and must receive the

waste products of its activity; it also means that it must surround the cell with those physical and chemical conditions which are essential to its healthy life; for example, the pressure of the lymph upon the surface of the cell must not exceed certain limits; moreover, in addition to the food supply the lymph must contain certain salts which, though not oxidizable and hence not yielding energy for the work of the cell, maintain by their presence a proper osmotic tension outside of the cell, and no doubt, as has been recently suggested by Loeb, take part in the chemical re-actions of the living substance.

It is clear that the flow of lymph away from the tissues affords a ready means of regulating pressure within the interstitial spaces, for an undue rise of pressure in these spaces would at once cause some of the lymph to leave by the lymphatics; and it is known that oedema may result when the lymphatics have become occluded. We may, therefore, conclude that the regulation of interstitial pressure is one of the functions of the lymph flow.

The lymphatic system has also been regarded as a second channel for the removal of the waste products of cell metabolism. These products are, of course, discharged by the cells directly upon the interstitial lymph and may leave the organ either through the lymphatics or through the capillaries and veins; in the latter case diffusion must occur through the capillary wall. With regard to one of the most important of the waste products of tissue activity, carbon dioxide, there can be no doubt that it is removed by diffusion into the blood and that the lymph plays little or no part in its excretion from the body; the lymph currents would, in fact, be far too slow for this purpose. With regard, however, to those waste products which are in solution, it is not so easy to determine what proportion leaves the tissue by the one channel or the other. It is known, however, that these waste products are removed in large quantities by the blood when the flow of lymph from the organ has been stopped. Furthermore, easily detected substances have been injected into the interstitial connective tissues of organs and the time of their appearance in the blood and lymph respectively noted; it is found in such cases that these substances do, in fact, appear in the blood frequently as rapidly as they do in the lymph and at times much more rapidly. Without going into the details of the matter, I think that physiologists will agree that by far the larger amount of waste products, no matter whether gases or solids in solution, are removed from the organs by the blood and not by the lymph,

and this is true despite the fact that a certain amount of dissolved solids must leave the organ in the lymph current. The slowness of this current is, of course, only another argument in support of the same view.

It has always seemed to me, however, that, although the lymph flow must thus play a subordinate role in the removal of waste products, it plays an obviously important but much neglected role in the nutrition of the cell. Reference to the diagram will show that not all points on the surfaces of the cell are equally removed from the blood vessels; in certain organs a cell may be at a considerable distance from a capillary and be dependent entirely upon the lymph for its food and the removal of its waste; again, one side of the cell may be turned toward the capillary while the opposite side adjoins other cells so that the latter surfaces can absorb only that food which has passed by lymph currents or by processes of diffusion to the lymph spaces in question. In short, there are only two ways in which the food which has transuded through the capillary wall may reach these cells or portions of cells not so favorably situated; first, by processes of diffusion; the percentage of food material must be highest near the capillary wall and lowest at those portions removed therefrom, where the cells have been constantly appropriating this food; there would naturally therefore be a diffusion of the food from the one point to the other. This, however, is probably an exceedingly slow process. The transfer of this food may, however, be accomplished in another way, *i.e.*, by the interstitial lymph currents. There can be no doubt that these currents exist, their general course being from the capillaries to the lymphatics; the food, etc., which is being delivered to the interstitial spaces by the blood is thus distributed more rapidly over the entire absorbing surface of the cells; the waste products, no longer dependent upon the slow process of diffusion for their conveyance to the capillary wall, are rapidly carried away in the current and before finally entering some lymphatic will generally come into contact with capillaries and so be removed; what has not been removed in this way will ultimately leave by the lymphatics themselves; finally these currents would obviously prevent such increase in the percentage of cystalloidal substances and of inorganic salts as would introduce unfavorable osmotic or other physical or chemical conditions into the immediate environment of the cell. The interstitial lymph currents are, therefore, of fundamental importance in maintaining the proper physical and chemical surroundings of the cell and

anything which favors them becomes an indispensable factor in the healthy working of an organ.

It is, moreover, self-evident that *these interstitial currents are dependent upon the lymph-flow away from the organ.* Their course is from the capillary to the lymphatic and they cannot exist to any large extent except as the result of the constant supply of liquid from the capillary and its constant removal from the lymphatic. What, then, are the causes of the flow of lymph in the lymphatics? These may be enumerated as follows:

1. The active forces of lymph-formation, which produce a certain amount of pressure within the interstitial spaces. The exact nature of these is in dispute; but upon any theory we should probably have an increase of interstitial pressure. It is probable, however, that this active force of lymph-formation is of importance chiefly during the activity of an organ and is of much less importance during rest; thus it has been noticed that, when a lymphatic leading away from a muscle is cut, little or no lymph flows from the cannula unless the muscle be thrown into activity or passive movements instituted. It would seem highly probable that in the resting organ where chemical changes are but slight, where the diffusible waste products of cell activity are not abundant, and where capillary pressure is comparatively low, the active force of lymph formation plays a subordinate role in the causation of the lymph flow which must consequently depend mainly upon the other factors to be enumerated.

2. Alternate contraction and relaxation of the circular muscles of the lymphatics, by means of which their contents are pumped onward. This no doubt aids in the result, but is of small importance compared with the next two agents.

3. The pumping action of muscular contractions and of changes in the position of parts of the body with regard to one another, as in alternate flexion and extension of the limbs and trunk. This is the most important principle employed in mechano-therapy and affects both the flow of blood in the veins and that of lymph in the lymphatics, although in the physiological explanations of the matter the effect on the veins is usually emphasized to the partial or complete neglect of the equally important effect on the lymph flow. This agent, however, affects the lymph flow only in those organs immediately concerned in the movements in question; for example contraction of the leg muscles pumps lymph from these muscles but is without effect upon the flow of lymph from the arms and neck.

4. The aspiration of the thorax. As we have already pointed out, the lymphatics arise for the most part in extrathoracic organs and end within the thorax; and it has long been known that the aspirating power of the thorax is one of the main causes of the lymph-flow; in other words lymph is being sucked into the thoracic lymphatics, because the pleural pressure to which these thin-walled tubes is exposed is less than that of the atmosphere to which extrathoracic lymphatics are exposed; this suction is increased during inspiration.

There can be no doubt that of these factors the first, third, and fourth are by far the most important, and reasons have been given for thinking that the first (active force of lymph-formation) plays a subordinate role in the resting organs; if this view of the case be correct, we must conclude that the pumping action of bodily movements and the aspiration of the thorax are indispensable agents in the maintenance of a vigorous flow in the lymphatics, hence of efficient currents in the interstitial spaces, and so in the maintenance of the normal environment of the living cell.

It has already been pointed out that the pumping action of bodily movements affect the lymph flow only in those organs concerned in the movements although the region so affected may at times be quite extensive. With the aspiration of the thorax the case is entirely different; here we deal with an agent which affects the lymph flow *from all organs*, except those of the thorax itself, and in the practical teaching of physiology, and especially the physiology of muscular exercise, too great stress cannot be laid on the fact that this is a function of the breathing movements second in importance only to the ventilation of the lungs; indeed we constantly see attributed to the more thorough ventilation of the lungs many favorable effects of deep breathing which should really be explained by the increased flow of lymph and hence the improvement of the interstitial environment of all living cells. Increased breathing movements thus exert a hygienic effect upon the body as a whole out of all proportion to their actual expenditure of muscular energy.

And so we have one important reason why muscular exercise favorably affects other organs than those which are immediately concerned. In explanation of this fact the statement is frequently made that it "quickens the circulation"; if we mean by this that it increases the amount of blood which the heart pumps out in a given time, the statement is true enough but affords no explanation of the phenomenon in question. It must not be supposed that the circulation is quickened through all organs of the

body; the muscles and the skin, indeed, receive an increased supply of blood; but the arterioles of internal organs are almost certainly constricted and it is doubtful whether there is any marked change in the supply of blood to the brain; thus the circulation in some organs, so far from being quickened, is actually diminished. When we turn, however, to the mechanism of the lymphatic system, as explained in this paper, it becomes evident that muscular exercise increases the interstitial currents not only in the working organs such as the muscles and the skin, but equally in those organs whose supply of blood is, for the time being, diminished.

Nor is it necessary that I should more than refer to the obvious fact that muscular activity is *the one agent* of our normal life which brings into increased play both of these indispensable factors in the production of an efficient lymph flow; indeed I am not sure but that we have here the heaviest indictment against a sedentary life. The living cell must be surrounded by its proper environment to maintain its working capacity; and that environment is dependent upon factors which can be supplied only by suitable muscular activity. Nor is it necessary that this exercise shall be excessive or long continued; frequent short recesses in which children engage in active play, but not for a sufficiently long time to produce neuro-muscular and general fatigue, are required as a part of their physical training; nor are we going too far in saying that the objections which are raised to the recess because of the bad moral influence which one pupil may thus have a chance to exert over another, is a survival of that asceticism which once supposed that the mind thrives best when the body is neglected and despised; the danger of an immoral life is rather enhanced by denying the living cells of the body their normal healthy environment and so their chance for normal healthy growth.

It is an attractive field of speculation what part the removal of the normal interstitial environment of the cell may play in the genesis of pathological conditions, especially those of slow and imperceptible growth; probably the changes are too obscure to warrant the hope of definite knowledge on the subject for many years to come. Meanwhile practical personal hygiene is justified in pointing out the very obvious danger, even though it cannot predict the disease which may ultimately result.

I have dealt thus fully with the physiology of the lymphatic system, even at the risk of being tiresome to those of my readers

who have studied physiology more or less extensively and to whom most of the facts presented must be an old story, because I feel that the text-books of physiology fail to emphasize the importance of the mechanism of the lymphatic system in securing the efficiency of interstitial lymph currents and so maintaining the proper environment of the tissue cells. It is hard to believe that others have not thought of this; but if they have given expression to their ideas I have not come across them in the literature; at any rate the idea does not seem to have affected the preparation of physiological text-books; and all this despite the fact that it would seem to be of the most fundamental practical hygienic importance.

SCHOOL FURNITURE IN RELATION TO LATERAL CURVATURE.

J. S. STONE, M.D.,

Boston.

Lateral curvature of the spine or scoliosis is a disease beginning usually during the school age in the period of rapid development. It is rare in infancy or very early childhood, but increases in frequency as children grow older, so that about three-fourths of the cases are first seen between the ages of eight and fourteen. The frequency of the disease has been carefully investigated in various European cities. In Dresden, Kunig found lateral curvature in 24 per cent of the scholars in the common schools. In Nuremberg 15 per cent are affected, and in Munich 7 per cent. About four or five times as many girls are affected as boys.

The distortion of the body in lateral curvature is usually practically identical with that assumed ordinarily in writing the old-fashioned oblique script. There are recognized four positions in which the writing book may be held. It may be directly in front of the median line of the body, or to the right of it, and in each of these two positions it may be held either squarely or obliquely.

There is a general agreement that the book should be held in front of the body, because if held to the right more or less malposition is necessarily assumed. The weight of opinion is decidedly in favor of the vertical as compared with the oblique position; and of course this means that the vertical penmanship is preferable to the oblique. If the book is held at an angle the head inevitably turns so that the axis of the eyes may become parallel with the line of writing. This movement of the head is in itself sufficient, by producing a change in the centre of gravity, to cause a slight curve of the spine. Moreover, owing to the complex nature of the joints between the vertebrae the motions of rotation and of lateral flexion are necessarily associated; the one movement being almost impossible without the other, a fact which tends to the production of the characteristic scoliosis. In addition, the right arm is soon pushed forward and upward onto

the desk, while the left is dropped down and often off the edge of the desk. Thus the curve is increased. Meyer and Schenk have both investigated carefully the relation between the ordinary writing position and lateral curvature. Of two hundred pupils examined by Schenk over three-fourths sat in writing with a deviation of the upper part of the body to the left, and all of these maintained this deviation, to a greater or less extent, when not writing. In Nuremberg twice as many incorrect postures were found among those who wrote the oblique as among those who wrote the vertical script; in Munich two and a half times as many; in Fürth and Würzburg four times as many. Yet in the face of these facts the vertical penmanship is often strongly opposed.

Of course a large majority of healthy, strong children can withstand without much permanent harm malpositions in writing and misfitting, as regards school seats and desks. But when we consider the long school terms, the high pressure in school, and the conditions under which children in the cities live, there is every reason why they should be placed under the most favorable conditions at school. Very great reforms have been made in school hygiene in all directions, but conditions are still unsatisfactory.

The movement for reform in school furniture may be said to have begun in 1841, when Barnard, of Hartford, published his classic work on school architecture. Ten years earlier in Boston Dr. John C. Warren and Dr. Alcott, and in New York Mr. William J. Adams, had begun to advocate the use of sloping desks of proper heights, the separation of the seats from the desk behind, and the use of individual seats with backs. There are now certain universally accepted principles in regard to seats and desks. The height of the seat should equal the height to the knee, with the feet squarely on the floor. The width of the seat should be but little more than the width across the buttocks, in order to prevent children from sliding laterally and thus assuming faulty attitudes. The depth of the seat should be about two-thirds the length of the thigh. The difference in height between the desk surface and the seat surface should be such that the elbow very slightly raised, as in writing, may rest easily upon the desk. In order to secure these objects the modern adjustable furniture has been devised, and to make adjustment easy various scales have been constructed. The question of proper seating becomes in

these respects, then, solely one of ordinary intelligence in measuring the children once, or at most, twice a year and of adjusting the seat and desk at the heights indicated by the scale. The very great amount of improperly fitting furniture in the Boston public schools was shown by Dr. Scudder eight years ago. Similar conditions existed then and still exist in many cities. Of course it is not to be expected that school furniture, otherwise good, will be discarded because not adjustable, yet it is to be expected that in furnishing new schoolhouses adjustable furniture will be purchased. The importance of the subject is recognized elsewhere, as is shown by the recent order for 116,000 adjustable desks for Cuba. Is it not as important that children at home should be as well provided for as those in Cuba?

There are certain questions in regard to the desk slope, the chair back and the horizontal distance between the edge of the desk and the front of the seat, about which there has been much discussion. The ideal desk slope for reading should be 45° because the eyes can then be directed downward without fatigue, and without bending the head forward. This slope is, however, not practicable for writing. As a compromise a slope of from one in six to one in eight has been generally adopted.

In regard to the horizontal distance between the desk and the seat, there is a general agreement that from the hygienic standpoint a minus distance of several inches is desirable; that is, that the desk should somewhat overhang the seat. The distance should be approximately such that with the elbows against the back of the seat the wrists should reach the edge of the desk. The objection to this has been largely the difficulty of getting into and out of the seats. In order to overcome this difficulty a great number of mechanical devices have been used. In some cases the desk surface is moved forward and back as a whole, or in part; in other cases it is made to fold up or down. Any device which splits the writing surface is objectionable. There are two practical devices by which the desk surface as a whole may be moved forward and back, and by which the slope may be changed. These are found in the Simplex desk of Schenk and in the Chandler adjustable desk top made in this country. The latter is simple and comparatively inexpensive.

Many types of movable seats have been tried. In some the seats move forward and back with or without the supports. In others the seats fold up or down as do theatre seats. In others

the seat rotates upon its support. In others there are combined adjustments for height and distance, but none of these seats are entirely satisfactory.

The form of chair back has been the great problem. In sitting the weight of the body is borne by the seat bones and the under surface of the thighs. There are recognized three typical sitting postures, the upright, the forward, and the backward. In the upright position, when the centre of gravity falls directly on a line connecting the tuberosities, the body can be maintained in equilibrium without great muscular exertion, but of course it is not practical to maintain this position for any length of time without support. In the forward position support soon becomes necessary and is secured by leaning on the desk. In this position there is great liability to assume faulty attitudes. So great is the liability to malposition when the child is leaning forward that Schenk and Lorenz advocate writing in the reclining position with the back placed at an angle of about ten degrees. There are, however, certain practical objections to this. In writing, a forward position is naturally taken. A reclining position is awkward unless an impracticable desk slope is adopted. In the forward position, however, there is ordinarily no support for the spine. In the backward position, although the rolling back of the pelvis is limited by the end of the spinal column, some support higher up is necessary to avoid great fatigue. There are two essentials to a proper back. In the first place, under no circumstances should the shoulders be forced forward. In the second place, the physiological anterior lumbar curve should be maintained. That is to say, there should be a firm support for the lower part of the spine and at the same time a moderate support for the dorsal region up to the shoulder blades. In this way the liability to round shoulders is decreased and account is taken of the fact that full extension or straightening of the spine backward tends to prevent lateral curvature while flexion allows it.

The necessity for a proper support for the lumbar spine has been recognized in the seats made for typewriters. Although the typewriter is able to move about more freely than the scholar, can regulate the distance between her chair and her work, which the scholar cannot do, can regulate the height of her chair at will, which the scholar cannot do, it has still been found a matter of

commercial value to supply her with an adjustable automatic spring back constructed on hygienic principles. The introduction of the typewriter chair back has not come about through the agitation of theorists, but has been brought about through a recognition of the fact that the avoidance of fatigue is of financial value.

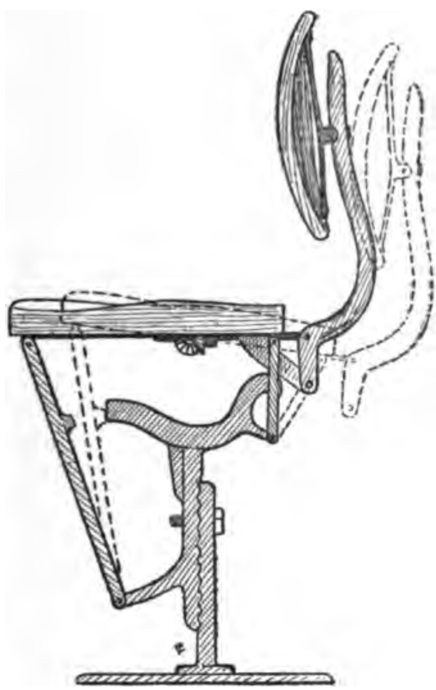
The question is whether the health and well being of the growing children of the community, not to mention the power to concentrate their minds on their work, is of as great importance as the comfort of the typewriters in whom, because of greater age, deformities are much less likely to arise.

In the past the great defect has been in the failure to recognize the fact that no attitude, no matter how good in itself, can be long maintained without fatigue. Change is necessary, and if a proper change in position is not possible the scholar must assume, for the sake of change alone, an improper position. Children thus inevitably lean upon the desk, slip down in their seats and twist first to one side and then to the other in order to try to rest the tired muscles of the back.

Thus in brief the condition of affairs in most cities at present is this: There is much old non-adjustable furniture which is still serviceable. Much of the new furniture purchased, except in some localities, is adjustable. Thus the adjustable furniture is gradually replacing the old-fashioned fixed furniture and for this reason any marked misfitting is now inexcusable. Height of seat and height of desk are thus easily regulated. As regards desk slope a fair compromise has been reached, and when adjustable desk tops are desired the additional cost is comparatively little. From the hygienic standpoint the front of the seat should be overhung slightly by the edge of the desk, but some device is desirable by which it may be easy to get into and out of the seat.

Although much attention has been given to the seat back, the manufacturers of school furniture in this country have not given the subject the attention it deserves. Until within a few years no attempt has been made to provide for any change in position on the part of the scholar. In order to allow a change in position from an upright to a reclining position, while still maintaining a proper support for the spine, Professor E. A. Miller, a few years ago, devised a chair on entirely new lines. In it the

child may move forward to the desk to write and when tired may lean back to rest. In either position there is support for the back. Professor Miller has lately made certain modifications from the chair as originally planned. The two essential changes are in the introduction of a back which can be moved forward or backward as a whole, while that portion of the chair back against which the spine rests is so attached as to allow changes in the



THE MILLER ADJUSTABLE SCHOOL CHAIR.*

curves of the spine while always tending to maintain the spine in the straight or extended position in which lateral curvature is least likely to occur.

As before stated most children get along somehow, in spite of being kept in the abnormal captivity of school. There is not the slightest excuse for putting any children at the disadvantage

* Devised by Prof. E. W. Miller and shown before the Boston Society for Medical Improvement, April 2, 1900.

of improperly fitting seats and desks. Yet in spite of the fact that their seats and desks are of proper heights, certain children will still develop deformity. It is for such children that Professor Miller's chair will be a great help. While it may not be feasible to introduce such chairs generally in a short time owing to the expense, if these chairs can be provided for certain weak children, selected, say, by the medical inspectors who, in many cities, visit the schools daily, much may be accomplished in the prevention of lateral curvature, which, once developed, is difficult and usually impossible to cure.

In December, 1897, Prof. Edward F. Miller, of the Massachusetts Institute of Technology, designed *a chair constructed on new principles. He has since modified the original model somewhat and showed the chair illustrated in the diagram before the Boston Society for Medical Improvement, on April 2, 1900.

By a method similar to that used in most adjustable furniture the height of the seat can be raised or lowered to suit the height of the pupil. The seat is carried by two cast-iron links running up from the movable casting which forms the upper part of the pedestal. The links turn on pins at either end. The link at the front is much longer than the link at the back. The links are so attached to the chair bottom that when the pupil leans forward the centre of gravity falls in front of the pedestal while it falls behind the pedestal when the pupil leans back. In one position the back link becomes nearly vertical and the seat becomes level, while at the same time the chair seat is carried forward about three inches. In the other position the front link becomes nearly vertical while the short link allows the chair to tip backward. Rubber buffers prevent noise and jar with the movement of the links.

The upright carrying the seat back is attached to the seat in such a way that the inclination as a whole can be altered by means of a bevel gear turned by a handle just under the edge of the seat. That portion against which the pupil leans may be raised or lowered as necessary. It is also so arranged with a swivel joint that it automatically adjusts itself to the varying curves of the spine, but always gives a much firmer support for the small of the back than for the upper part, owing to the fact that the upper part of the support above the swivel, is longer than the portion below.

THE RELATION BETWEEN PHYSIQUE AND MENTAL WORK.*

HENRY G. BEYER, M.D.,

U. S. Navy.

In 1893 Dr. W. T. Porter made the very important observation, after a careful and painstaking analysis of the weights of a large number of school-children, that precocious children weigh more and dull children less than the average of their age. The results of these investigations seemed to point clearly to the fact that there exists a rather close and unmistakable relationship between the weight of a child and its capacity for mental work. The establishment of such a relationship beyond question or doubt by scientific methods must be considered of fundamental importance, for almost all the suggestions and recommendations made by experts on school hygiene have somehow gravitated around this central idea, long before such a correlation was established on a scientific basis.

While many, therefore, seem to have accepted the fact of the existence of such a relationship without, apparently, waiting for proof, others have thrown doubts upon such conclusions as have been arrived at by Dr. Porter. Thus, with regard to Porter's conclusions that "precocious children are heavier and dull children lighter than the mean child of the same age," Franz Boas† states: "In fact, an investigation which I had carried on in Toronto with the same object in view, but according to a different method, gives just the reverse result. The data were compiled by Dr. G. M. West, who found that the children pronounced by the teacher as bright were less favorably developed than those called dull by their teachers."

Unless we are willing to admit that statistics prove either nothing, or that the same statistics in the hands of different in-

*This article is republished and the plates loaned through the courtesy of Dr. H. C. Ernst, Editor of the Journal of Boston Society of Medical Sciences, in which they first appeared. Journal of Boston Society of Medical Sciences, Vol. IV, No. 6.

*Science, March 1, 1895, p. 227.

vestigators may be made to prove diametrically opposite facts, this question must receive renewed attention, more especially since it is of great importance both from the point of view of school hygiene and physical training as well. When, therefore, several months ago, a small amount of material, fit for such an undertaking, chanced to come my way, I at once determined to utilize it for this purpose, employing, however, a new method for arriving at the desired results. It happened that I was detailed a member of an Examining Board, the duty of which was to examine 85 applicants for positions as navy yard apprentices, both physically and mentally. Each applicant, according to the order constituting the board, was to be marked (!) as regards his physique, 100 being considered perfect. The mental examination was to consist in both oral and written examinations, and included spelling, simple arithmetic, also decimals and the rule of three, 100 being considered perfect. As the only medical member of the board, I asked that my duty be limited to the physical examination alone, which request was granted.

With reference to physical examinations in general, there never had been any system in vogue, either in the navy, army, or elsewhere to my knowledge, which made it obligatory for the examiner to give the examinee a definite mark, expressed by a number, that number to be exactly what the candidate deserved, and which was to count in the sum total of his entire examination, and thus be made the means of either assisting him in or preventing him from getting a coveted position. A candidate for any position in the naval service, for example, is found either fit or unfit, is either accepted or rejected accordingly, on his general physical qualifications, without there being any fixed or accurate standard of marking. In case an examination is required, the marks obtained in the mental are the only marks that count. Being, however, obliged to give each boy a mark which he deserved by the order under which our board was bound to perform its duty, the idea occurred to me to apply the tables of percentile grades which were suitable to the ages of the candidates and give to each one the proper number of the percentage into which, by nature, and according to accurately determined measurements, he belonged.

In this simple manner a boy becomes his own physical record and takes his percentage position and number without there be-

ing the slightest chance for the examiner to do him the least injustice nor, on the other hand, favor him in any way. These marks, moreover, will be perfectly homogeneous with those that are given in the mental examinations, in which 100 is considered perfect, and which is the case in most of our public schools. No mental examination seems quite equal to it as regards accuracy of results and justice to the individual.

If the boy is superior in physique, takes a high percentage position accordingly, he simply has advantages which it is useless to dispute him; in case he is inferior, he has been unfortunate in the selection of his ancestors. Certainly no argument can change his record.

Method: The method is simple, though perhaps best exemplified by a definite case: A boy's age is calculated from the nearest birthday and found to be fifteen years; he is measured in the usual way and his height is recorded as 64.3 inches. What is his mark for height?

Taking Table XIX., for convenience' sake, reproduced below, we find the line of heights opposite the fifteen-year-old boys; this line we follow until we come to 64.29, which is the mark nearest his recorded height, and the percentage number above this value being "50," it is the mark which the boy is entitled to receive for that dimension; he happens to be an average or mean boy for his age so far as height is concerned. This same process is followed out as regards any other item, by simply referring to the respective tables representing, in percentile grades, the dimension that is to be ascertained and marked. Height, weight, and chest circumference being the leading characteristics in physique, these were the only ones recorded for our present purpose. The several percentage values, ascertained after this manner, are now summed up and averaged; their average constitutes the boy's mark for his physical examination. The number represents that which he has made out of a possible one hundred.

TABLE XIX.

Heights in Percentages. [1]

Age at nearest Birthday.	No. of Observations.	Values in Inches at the following Percentile Grades.										
		5	10	20	30	40	50	60	70	80	90	95
15	131	59.507	60.310	61.563	62.553	63.457	64.290	64.855	65.764	66.653	67.717	69.290
16	395	61.750	62.549	63.714	64.580	65.250	65.805	66.455	67.200	68.020	69.000	70.406
17	722	63.130	64.217	65.165	65.853	66.434	67.000	67.626	68.317	69.100	70.320	71.320
18	841	64.193	65.000	65.886	66.483	67.044	67.633	68.251	68.920	69.665	70.520	71.530
19	750	64.680	65.391	66.250	66.844	67.424	67.651	68.600	69.243	69.786	71.000	71.880
20	645	64.962	65.543	66.413	67.094	67.675	68.252	68.810	69.477	70.253	71.280	72.120
21	493	64.970	65.620	66.433	67.054	67.667	68.215	68.852	69.483	70.180	71.120	72.000
22	328	64.945	65.831	66.580	67.200	67.762	68.352	68.960	69.927	70.632	71.543	72.258
23	232	65.287	65.800	66.580	67.300	68.010	68.522	69.030	69.625	70.307	71.240	72.000

1 See Beyer — U. S. Naval Inst. Proc., No. 74.

There is, however, one item which is not to be found in these percentile grade tables, but which must, nevertheless, be included in the result. This item we have designated "General Health," and its value is ascertained through an examination which is principally medical in character. The chief factor in the calculation of this is a good sound heart, with a pair of good sound lungs; a secondary factor is whether a boy approaches or not, more or less closely, the percentile grade into which he would seem to belong in accordance with the greatest number and the most important portions of his dimensions. A boy, for example, whose height puts him into the 75th percentile grade, but whose chest circumference places him in the 25th percentile grade, would not be entitled to receive the mathematical average of these two numbers for general health, but would receive 35 instead of 50.

In accordance with the method described above, 85 boys of an average age of 16 years were examined in the Boston Navy Yard, about 3 months ago. Seventy of these were accepted (82 per cent) and 15 rejected (18 per cent). All the boys came from the immediate vicinity of Charlestown, and had left school on the average for the preceding two years.

A comparison of the averages seen in Table 1 shows that the accepted boys are superior in physical development in every respect to those that were rejected, but more especially so as regards weight, chest circumference, and general health, notwithstanding the fact that the examination was not at all severe, and many of the boys were included in the accepted lot who would not have had the least chance of passing the physical examination had they been intending to enlist for the regular navy.

Of the seventy boys who had passed their physical examination but sixty-two presented themselves for the final mental examination. One, being a colored boy, was excluded from my list, on account of its being desirable to have the material homogeneous for the purpose of further comparison, and this left sixty-one to be studied. After all the boys had completed both examinations, each received his final mark, calculated in accordance with the formula shown in Table 2.

The difference in the multiple between the three classes of examinations shows the relative values which were attached to

Table I.

Averages Compared.

Averages.	A. In Percentile Grades.						B. In Actual Measurements.					
	Age.	Height.	Weight.	Chest C.	Gen. H.	Ave.	Age.	Height.	Weight.	Chest C.	Gen. H.	Ave.
All, 85 boys	16	34	38	45	40	39	16	64.9 in.	112 lbs.	30.8 in.	40	39
70 boys accepted	16	34	40	48	42	41	16	64.9 in.	114 lbs.	31 in.	42	41
15 boys rejected.........	16	32	25	26	20	26	16	64.7 in.	106 lbs.	29.7 in.	20	26
Differences.............		2	15	22	22	15		0.2 in.	8 lbs.	1.3 in.	22	15

each, and the total number means what the candidate made in all out of a possible one thousand.

A list was now made out on which the names of all the boys examined appeared in the order of their relative merit, so that

TABLE 2.

William B.	Mark.	X Multiple.	= Total.
Physical Ex.	50	X 3	= 150
Written "	75	X 5	= 375
Oral "	83	X 2	= 166
Total			691

the boy having received the highest mark stood first on this list, while the boy with the lowest mark stood at the bottom of it. Dividing, furthermore, the total number of sixty-one boys into six sections, we would, of course, expect to find that the first section of ten would present the highest average, while the last section would yield the lowest average, at least so far as concerns the column of "Totals." The same relative result need not neces-

TABLE 3.

Examination Averages. [1]

Ten.	Physical.	Mental.	Total.
1	296	415	770
2	263	332	667
3	215	297	598
4	185	255	541
5	157	222	496
6	95	191	404

1 The oral examination was not included in these averages, not really amounting to the value of an examination.

sarily be expected from similar averages obtained, for instance, from the column of physical marks. If, however, the physical composition of a boy has indeed any relation to his mental qualifications,—if, in other words, there exists a psycho-physical correlation in man,—then we should, indeed, expect to find on a comparison of the averages obtained from the physical and mental examinations that they would all show, equally, a gradual decrease in values from the first to the last, and this, in fact, is shown to be the case in Table 3.

Plate 1, which was constructed from the figures presented by Table 3, shows the relations existing between these several different averages in a still clearer light. In Table 3 as well as in Plate 1 both the physical and mental examination marks received the same multiple, namely, "5," for the sake of bringing out the exact relations existing between the two.

In the marks from which the physical curve was made are contained increments of height, weight, chest circumference, and general health. It was, therefore, of considerable interest as well as importance to ascertain whether all these four different items contributed alike, or whether one or the other of them contributed more than another towards the general result. With this end in view each one of the four items was arranged in the same order as were the totals, with the result seen in Table 4.

TABLE 4.

Averages in Per Cent.

Ten.	Height.	Weight.	Chest Circ.	General Health.
1....................	55.4	64.4	64.2	58.0
2....................	37.4	60.4	61.5	53.0
3....................	38.4	39.4	49.6	45.0
4....................	35.5	29.2	35.8	36.0
5....................	27.3	31.3	41.1	37.0
6....................	10.0	14.0	26.0	28.0

Table 4 shows that there is a difference between the average obtained from the first ten and that obtained from the last eleven

of 45 per cent in height, 50 per cent in weight, 38 per cent in chest circumference, and 25 per cent in general health, and the inference, therefore, seems but logical; namely, that all the items which together form the total physical mark in our examination contributed in a measure towards the general result, in apparently so forcible and striking a manner as to leave no room for doubt as regards their meaning and significance. In addition, therefore, of its being a new and practical method of examining, an analysis of the results that have, so far, been obtained with it, have led to the discovery of a most important and significant relationship between the physique and the mental performances of man.

Since the several examinations of the first sixty-one candidates were brought to a close, fifteen more boys have been examined after the same method, and by the same board. The names of these fifteen boys, with their relative merit-marks, were incorporated in the original merit-list, increasing the number from 61 to 76. The influence of this operation is scarcely perceptible, and the curves representing the different averages have maintained their original relative parallelism.

The present investigation could scarcely be considered complete unless some special inquiry was made into the relative influence upon the mental work of children borne by the weight alone. Prof. Franz Boas (*l.c.*) stated that "from the data compiled by Dr. G. M. West, the children pronounced by the teacher as bright were less favorably developed than those called dull by their teachers," while Dr. Porter's results were that "precocious children are heavier and dull children lighter than the mean child of the same age." This, in fact, seems to me to be the most serious practical criticism on Porter's conclusions that could be made, and, if true, would set aside the results of all his efforts and labors on this problem as erroneous.

I take it for granted that the "less favorably developed" child means also a lighter child and that a "more favorably developed" child means a heavier one than the average or mean child of the same age. Not being in a position to approach the problem according to the method used by Porter, being, furthermore, limited as regards materials, I concluded to employ a formula for the determination of a person's weight, first recommended by Vierordt. Vierordt determines the weight of a person under

the average conditions of nutrition by means of the following formula: $\frac{L.B.}{240}$ = K., where "L" represents the length or height of the body in centimetres, multiplied by "B," the circumference of the chest, taken at the level of the nipples. The sum thus obtained when divided by 240 gives the body weight in Kilos = K.

In accordance with this formula I proceeded to calculate the weights of all the seventy-six boys on my list, and on comparing the actual weight of each of them with the calculated weight I found, while a small number of them showed neither plus nor minus differences, the great majority of the seventy-six weighed either more or less than the amount required by our formula. Again arranging the names of all the seventy-six boys in the order of the relative examination merit, and then attaching to each name the plus or minus values obtained from the above calculation of weights, I must confess to no small surprise when noticing the results which are here exhibited in the following Table 5.

In making out this table the seventy-five boys were divided into sections of fifteen each; the last one was omitted in order that each section should contain only fifteen; the plus or minus values were now added together for each section, with the result to be seen in Table 5, but still better shown in Plate 3.

TABLE 5.

Showing the Number of Pounds Plus or Minus of each Section of Fifteen, from First to Last.

VALUES :	+	–
First section	105	7
Second section	48	39
Third section	22	79
Fourth section	17	84
Fifth section	4	104

A mere glance at such a table would go far in convincing any one of the great significance that must be attached to the weight

in judging a child's physique and, consequently, also its capacity for mental work.

In conclusion, therefore, I should say (1) that all the important results obtained by Porter by his researches on "Precocity and Dulness" are hereby confirmed; (2) the adoption of the method of examination described in this paper by the public schools would seem to be desirable because meeting a long-felt need; (3) the percentile grade tables, prepared by Dr. H. P. Bowditch, would be best adapted for use in the schools of Massachusetts.

DESCRIPTION OF PLATES.

Plate I represents six averages of ten; the upper curve shows the averages from the totals; the middle curve shows the averages from the mental examination alone; the lower curve the same from the physical examination alone.

Plate II represents the results from eight averages arranged as in Plate I.

Plate III refers to weight alone, when total number is divided into sections of fifteen each and the first section represents the highest, the last section the lowest, total averages.

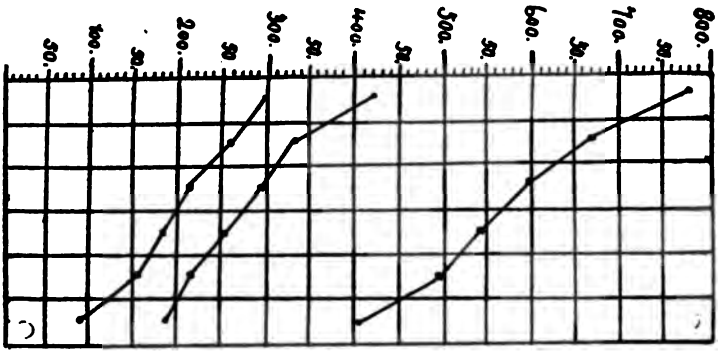


Plate 1.

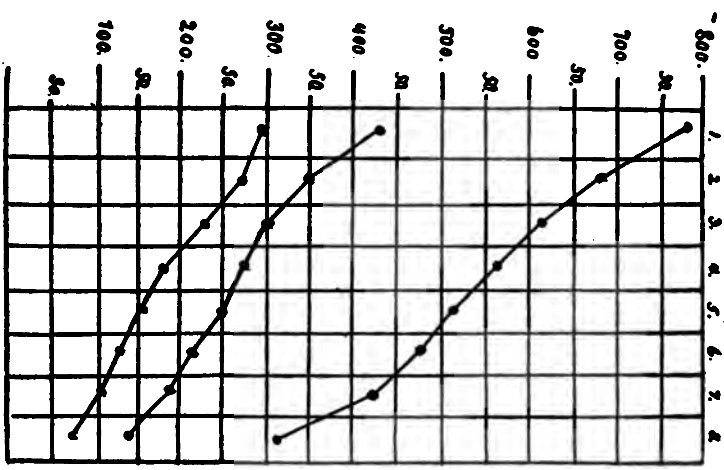


Plate 2.

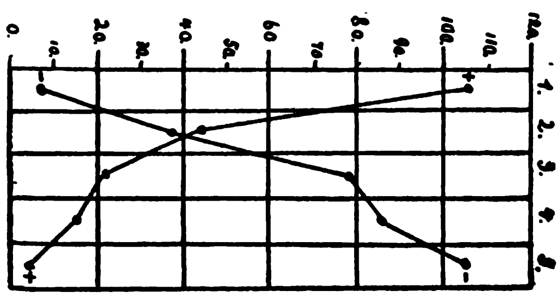


Plate 3.

REPORTS FROM SOCIETIES.

BALTIMORE PHYSICAL EDUCATION SOCIETY.

The society held its last meeting for the season at the Johns Hopkins University, on Wednesday, May 23rd, 1900.

Since the society's re-organization in December, 1899, the work has been pursued with renewed interest and enthusiasm. During the year the meetings were held at the different gymnasia of the city—Johns Hopkins University, The Woman's College, Bryn Mawr School, Maryland Normal School, Maryland School for the Blind, Medical Gymnastic Institute and Turnverein Vorwârts, the buildings and apparatus of which were inspected, and the distinctive characteristics explained and commented upon. The knowledge thus obtained was most interesting and useful, as practical demonstration was given of the many advantages Baltimore has in the field of gymnastic and athletic work.

Among the papers read at the meetings during the year were:

1. The Gymnastic Central Institute of Stockholm, Sweden, by Miss Esther Porter.

2. F. L. Jahn, Founder of German Gymnastics, by Mr. C. F. E. Schulz.

3. Myotherapy, by Dr. N. Herman.

4. Characteristics of the Swedish system, by the late Nils Posse of Sweden and Boston, read and commented upon by Miss Porter.

5. Arm Flexion and Extension, an open discussion taken part in by those present.

The evident good resultant from the year's work has been increased interest, a fellowship and a combined effort for the furtherance of the purpose of the society—the mutual study and discussion of everyday problems in physical training, and the advancement of such interest throughout the State of Maryland.

MARIE PALMQUIST,
Secretary.

Baltimore, May 26, 1900.

BOSTON PHYSICAL EDUCATION SOCIETY.

The meetings of the Boston Society, since the first of the year, have been most interesting, and the attendance increasingly good.

The February meeting was favored with a paper by Dr. George Wells Fitz, on "Practical Child Study"; that on March 8th, by a paper from Dr. H. G. Beyer, on "The Relation between Physique and Mental Work," and another from Dr. D. A. Sargent, on "Physical Defects Peculiar to the Student Class."

On April 12th, the society listened to Dr. Myles Standish, on "The Eyesight of School Children," and to Dr. J. S. Stone, on "The Seating of School Children."

On May 10th, Prof. W. O. Atwater, of Wesleyan University, Middletown, Conn., lectured on "Experiments on the Nutritive Value of Alcohol." The discussion following was participated in by Drs. Bowditch, Fitz, Batchelder, Hartwell and Balch.

The closing meeting of the year, and the most largely attended, was held on May 24th, when the President of the society, Dr. Robert W. Lovett, spoke on "The Mechanics and Gymnastic Treatment of Lateral Curvature of the Spine."

With the exception of one stormy night, the attendance at the meetings has averaged over seventy-five, which was considered a good showing.

At the annual meeting, in January, the executive committee was authorized to organize sections for more individual work than is possible in the regular meetings of the society, and as a result, there are three such sections at work.

The section on Public School Work, with thirty-five members, has Miss Lillian M. Towne as chairman, and has held three meetings. The purpose of the section is to carry on original work in observation and experiment, hence the members first turned their attention to postures that may become apparent during recitation or study periods, when the pupils are allowed to follow their own inclinations. Some forty reports have been collected, and more are expected. It is hoped that the cumulative results may be tabulated.

In connection with the seasons, reports are being collected dealing with the activities of pupils during school recess.

A bibliography of fourteen books upon "Posture" has been collected, and one upon the subject "Play" has been commenced.

The section on Medical Gymnastics, with twenty-nine members,

under the chairman, Dr. G. W. Fitz, has held two organization meetings and one regular meeting, at which was considered "The Gymnastic Treatment of Chronic Constipation." At the June meeting, the treatment of heart disease by exercise will be taken up.

The Anthropometry Section, organized by Dr. D. F. Lincoln, chairman, has held several meetings of much interest.

In April, a discussion on "Chest Capacity with and without Ferris Waists and Corsets," brought out much interesting data. A bibliography on the subject of Anthropometry, is being prepared.

On April 27th, the section listened to a description of the Bertillon System of Measurements, by members of the Boston Bureau of Criminal Investigation.

One more section, that on "Normal Schools and Gymnasia," has been planned, but circumstances have prevented its formal organization.

So far, the sections give promise of proving a success, and of bringing more persons into direct touch with the work of Physical Education.

Each section will report once during the year to the general society, and take charge of the meeting for that evening.

MARY REES MULLINER,
Boston, May 28th, 1900. Secretary.

NEW HAVEN PHYSICAL EDUCATION SOCIETY.

The last meeting of the New Haven Physical Education society, and will take charge of the meeting for that evening. Work," dwelling especially upon play.

Two new members were admitted. The meeting then adjourned until October, the subject for that meeting being "Summer School Work."

ANNIE RENNARD HUGHES,
Secretary.

REPORTS OF THE COUNCIL.

Meeting, April 6.

Present: Drs. Sargent, Seaver, Fitz, Mr. Eberhard and Baroness Posse. Reports of the secretaries and treasurer were read and approved.

The Treasurer reported as follows: Balance on hand as per report of March 2d, $61.83; received during interval, $142.76; total, $204.59. Paid, $27.88; balance on hand, $176.71.

The following members were elected: Miss Agnes Schlick, 1822 6th St., Harrisburg, Pa.; Wm. E. Fowler, 1st District Court of Eastern Worcester, Westborough, Mass.; A. W. Bass, Physical Director, Y. M. C. A., Evanston, Ill.; Miss May B. Lyon, 423 E. State St., Trenton, N. J.; Miss M. W. Butler, Temple College, Philadelphia, Pa.

A letter was read from the N. A. Gymnastic Union inviting the members of the A. A. A. P. E. to its convention, to be held in Philadelphia, June 21, 22 and 23. It was voted that each member of the council be invited to represent the society, and that each local society be requested to send one representative.

Voted, that the president and secretary be empowered to choose six persons to represent the A. A. A. P. E. at the Paris Exposition.

The remainder of the evening was devoted to the discussion of desirable changes in the constitution. Adjourned.

Meeting, May 11.

Present: Drs. Sargent, Hitchcock, Fitz, and Mulliner and Baroness Posse. The usual reports were read.

Dr. Sargent presented report of the Committee of Five.

The Treasurer reported as follows: Balance on hand as per report of April, $176.71; received during interval, $117.90; total, $294.61. Paid, $210.79; balance on hand, $83.82.

The following members were elected: Miss Lora D. Fowler, 103 Forest St., Oberlin, O.; Miss Florence Heath, 104 Garfield Ave., Benton Harbor, Mich.; Miss Alice Ruth Keeler, No. Wilton, Conn.; Miss Agnes Belle Pitkin, 816 Union St., Schenectady, N. Y.; Miss Lila J. Wickwire, 103 N. Main St., Farmington, Ill.; Miss G. B. Whitridge, 143 Pleasant Ave., St. Paul, Minn.; David W. Stevenson, M.D., Richmond, Ind.; Miss Maria E. Balcom, 15 Cottage St., Buffalo, N. Y.

It was voted that the president be instructed to give for publication in the REVIEW, an outline of his scheme for the division of the Society into sections. Adjourned.

BARONESS ROSE POSSE,
Recording Secretary.

EDITORIAL NOTE AND COMMENT.

The establishment of a bureau for the scientific study of the public school children of Chicago, through the efforts of Dr. Christopher, marks the beginning of a new movement in education. The fight between the "faddists" and the "3 R-ists" may be considered to be approaching its end, for the simple reason that parents cannot fail to appreciate the effort which this bureau will make in behalf of the development of their children. To discover the natural bent of the child, and to bring him to the highest possible degree of working efficiency through the discovery and correction of sense defects and of physical and mental deficiencies, are aims which must appeal to every parent. It is further to be hoped that the efficiency of the bureau will convince the public in general that experts may be trusted to control the schools, and that thereby this branch of public service may be freed from its worst enemies, the politicians. It is certainly very encouraging that such work is not confined to Chicago, but is being started in numerous other schools of this country.

Those interested in physical training must welcome the growing popular demand for information in their subject. Some journals recognizing the value and importance of this demand, have developed departments in which inquiries in regard to exercise and hygiene may be made and answered. The Five Minute Talks on Good Health in the Ladies' Home Journal, for example, include illustrated lessons in exercises for special parts of the body, and as a whole form a fairly complete series. These exercises, although as a rule carefully selected and sensibly given, are, however, often associated with health advices which could emanate only from a department presided over by a man ignorant of scientific medicine, and therefore free to draw upon his imagination for interesting items of information. The following examples are selected almost at random:

Ques. "What is Health?" Ans. "Perfect health is that con-

dition of the body when digestion is so perfect that the physiological balance between the destruction and construction that goes on ceaselessly in cell life is daily kept normal."

Ques. "Strength from the Earth?" Ans. "No. The earth is negative and robs us of our electrical force which we gather from the positive influence of the sun and the air; hence the wonderfully exhilarating influence of deep breathing of good air and then insulating yourself (your feet) to retain the strength thus received."

Ques. "Winter Underwear—what should it be?" Ans. "Nearly everyone will answer woolen. The woolen theory is dying out; so are those who adopt it. So long as people insist upon wearing wool in the winter, so long will the doctors reap a harvest from colds, catarrh, pneumonia, etc. * * * * "

The statement is specifically made that muscular energy comes from fat, and the protein alone repairs wastes. Bathing is forbidden when one is tired, in spite of the fact that a hot bath is then most refreshing. One is advised to omit breakfast and to live on two meals, on the ground that one cannot do hard work with a full stomach, regardless of the fact that many women and children are faint and weak and incapable of effort in the morning, because of having eaten little or no breakfast.

It is unfortunate that the Ladies' Home Journal which, because of its recognized value has gained entrance into so many thousands of homes, should countenance such ignorance of scientific hygiene under the guise of hygienic advice.

It is earnestly to be hoped that the time will come when the non-medical teacher of gymnastics will feel that his work in constructive personal hygiene is a sufficient field for his genius, and does not entitle him to pass judgment upon all pathological conditions or upon the treatment of all disturbances of health.

NEWS NOTES.

PROGRAMME OF INTERNATIONAL CONTESTS OF PHYSICAL EXERCISES AND SPORTS, PARIS, 1900.

May 15 to June 15—Fencing.
May—Automobile (Touring Carriages).
May 20, 22, 24, 27—Yaching (River Sailing Races).
May 27 to June 10—Longue Paume.
May 29, 31, June 2—Equestrian Sports.
June 23 and 24—Yachting (propelled by mechanical means).
June 24—Croquet.
June 17 to 24—Aerostation.
June 24—Carrier Pigeon (Exhibition).
June 25—Carrier Pigeon (Flying Competitions).
July—Yachting (Sea).
July 1, 3, 5—Professional Athletics.
July 15, 17, 19, 22—Amateur Athletics.
July 6—Lawn Tennis.
July 29—La Crosse.
July—Automobile (Speed).
July 29, 30—Gymnastics.
July 1, 15, 22, 29—Aerostation.
July 29—Carrier Pigeons (Exhibition Flying).
July 8 and 29—Carrier Pigeons (Flying Competitions).
August 26—Rowing.
August—Sailing Yacht Races (Sea).
August 12—Water Polo.
August 12 to 26—Swimming.
August 4, 5, 11, 19, 20—Cricket.
August 5—Fishing.
August 15—Bowling.
August—Automobiles (Small Carriages).
August—Tamis Ball.
August 26—Carrier Pigeons (Flying Competitions).

August 12, 19, 26—Aerostation.
September 16, 23, 30, Oct. 7—Association Foot Ball.
September 2—Base Ball.
September 30 to October 7—Hockey.
September 9 to 16—Bicycling.
September 9, 16, 20, 23—Aerostation.
September 16—Carrier Pigeons (Flying Competitions).
September 16—Carrier Pigeons (Flying Competitions.
October 14, 21, 28—Foot Ball.
October 2 to 9—Golf.

GYMNASTICS.

Condensed Programme of International Contests at Paris, July 29th and 30th, 1900.

CHAPTER V.

PROGRAMME OF THE EXERCISES.

The international championship contest will include sixteen trials:

	NO. OF POINTS.
First trial, fixed bar, one required exercise	20
Second trial, fixed bar, one free exercise	20
Third trial, parallel bars, one required exercise	20
Fourth trial, parallel bars, one free exercise	20
Fifth trial, rings, one required exercise	20
Sixth trial, rings, one free exercise	20
Seventh trial, horses, one required exercise	20
Eighth trial, horses, one free exercise	20
Ninth trial, setting up exercises, one required exercise	20
Tenth trial, setting up exercises, one free exercise	20
Eleventh trial, vault over horse lengthwise, one required exer.	20
Twelfth trial, combined high jump, one required exercise	20
Thirteenth trial, long jump, one required exercise	20
Fourteenth trial, pole vault, one required exercise	20
Fifteenth trial, smooth rope, one required exercise	20
Sixteenth trial, putting up of fifty-kilo stone with both arms, ten times, one required exercise	20
Maximum	320

CHAPTER VI.

DETAILS OF THE REQUIRED EXERCISES.

Fixed Bar. Strained suspension, grip above.

1. Full spring forward, backward and without stop, seat supported on the bar. (Legs crossing the right or left arm.) Reversal backwards, and passing without touching, the legs joined, beneath the bar, spring forward and back, stop at horizontal support, facing (free plank).
2. Supported turn backward and stop at the horizontal position, facing (plank in front).
3. Descend slowly to strained suspension.
4. Recovery without engaging.
5. Strained support, reversed (balance) in passing by the horizontal facing position (plank free), leap forward and between the arms to the station.

Parallel Bars. Being at the station at the end of the bars, grip above.

1. Entry at the side, legs squared.
2. Slide the left leg upon the right bar, pass the joined legs from without within on the left bar and without stopping from within without on the right bar, come to support. Swing with bent arms and leap forward to suspend support, legs squared.
3. Stretch out the body slowly in passing by the horizontal facing position (free plank), suspended reversed support.
4. Rest on shoulders, swing position, grip of the hands forward, swing backwards and throw the legs stretched out over the two bars, square.
5. Roll swing backwards, upon the shoulders with shift of the hands, extension of the arms, and without stopping drop between the bars to swing position, swing and without stopping double "dorsal" to right, left hand taking again the right bar, stop.

Rings. From hanging position.

1. Half turn backwards, legs and arms stretched out.
2. Swing backwards, forwards and reversal to strained reversed rest (balance).
3. Free horizontal rest (supporting plank).
4. Reversal backwards to horizontal facing suspension (plank in front).
5. Swing backwards to dislocation to position of swing and

without stopping swing backward to strained rest, leg straight out, reversal with legs spread, forward to position.

Horses. From facing position, head to the left, execute the exercises without stop.

Half circle of the legs to the right, above the right horse.

Circle of the right leg crossed above the left and the right horse.

Circle of the two legs to the left above the left and right horse.

Throw the left leg backwards above the left horse; two "scissors" backwards above the right horse, then above the left.

Throw the right leg backwards above the right horse. Half-circle of the two legs above the left horse.

Circle of the left leg crossed above the right and the left horse.

Two and a half circles of the joined legs, right, left right, left, and without stopping; double dorsal to right over neck and rump, with rotation of body to right, left hand on the rump, and clear behind, body expanded above the two horses with quarter turn to left to position, right hand on the rump, facing outside.

Setting-up exercises. From the normal position, hands clenched.

1. Leap from place, crossing the extended legs, left in front, with a circle and a half of the arms going out laterally to be crossed above, and drop to the position of legs separated laterally and arms up.

2. A quarter turn to left and forced bending of body forwards over left leg, arms down and in front, then back and up. The forehead touching as much as possible the left knee, the legs remaining extended.

3. Thrust forward of the left leg with circle of the arms forward, above and then arms at the sides.

4. Crouch on the left leg, bringing the left leg forward to the square, arms forward.

5. Stretching out of the left leg, right leg and arms horizontal at sides.

6. Throw the right leg and the right arm crossed towards the left and make three-quarters of a turn to left, pivoting on the toe of the left foot (to come back face in front), the arms passing above to the facial plane on the extended left leg, the right leg horizontal in the rear and the arms horizontal in front.

7. A quarter revolution of the body to the left, to the lateral plane on the extended left leg.

8. Straighten up the body vertically and make borghese thrust to the right side, right leg bent, leg left extended, left arm oblique forward and up, right arm oblique down and up, by a half-circle forward.

9, 10, 11 and 12, like 4, 5, 6 and 7, but in reverse order.

13. Straighten up the body to the position of the legs separated laterally, arms up.

14. Bending of the body forward, palms of the hands to the ground.

15. Reversed strained support, balance.

16. Lower the legs slowly to rest flat on ground, face down.

17. Spring, spread legs, to flat back rest. Rest on back and bring legs up over the head.

18. Swing position, hands supported on the thighs.

19. Raise the body by vigorous motion of the back ("carp swing") and come down to position with knees fully bent, arms forward.

20. Normal position.

Jumps. Combined high jumps on hard ground.

1. Jump with flying running start by means of stiff spring-board, over cord placed one meter from spring-board and 1m. 25 high, passing above the cord with legs spread out, fall and without stopping clear with joined feet a cord placed two meters from the first and 1 meter high.

2. Long jump, five meters.

3. Pole vault, 2m. 20.

Rope climbing.

Smooth rope, 6 meters.

Leave ground seated and with legs at right angles. Come down hand over hand with shoulder fully extended, the legs extended and joined.

Putting up stone.

Putting up 50 kilogram stone with both arms, ten times. Each putting up accomplished freely and slowly counts two points.

CHAPTER VII.

Article 32.—A preliminary trial will take place during the morning of the first day of the contest. It will consist of four exercises of the programme. The gymnasts getting 65 per cent of

the maximum of these points, that is, a total of 52 points, will alone be declared admissible and will continue the other trials.

The gymnasts not admissible will be definitely eliminated and will not continue the contest. They will keep only their rights to being classed for the social prizes.

The evening before the contest, the jury, in its first meeting, will determine by lot the apparatus by which each group must begin.

Article 33.—The optional exercises will be judged according to the following basis:

Pleasing and agreeable combination; difficulty of the various parts; elegant and sustained execution.

Prolonged stops at the rests and especially at the seatings, as well as too long combinations, must be avoided.

SUMMER SCHOOLS OF PHYSICAL TRAINING FOR 1900.

Chicago Institute Summer School, Chicago, Ill. July 2 to August 10.

Monteagle Assembly and Summer School, Monteagle, Tenn. School of Physical Education, July 5 to August 10.

University of Chicago, Chicago, Ill. Physical Culture Section, July 2.

Columbia University, City of New York, N. Y. July 2 to Angust 10.

Chautauqua School of Physical Education, Chautauqua, N. Y. July 9 to August 17.

Harvard Summer School of Physical Training, Cambridge. July 5 to August 15.

Posse Gymnasium Summer School, Boston, Mass. July.

Dr. Arnold's Summer Course in German Gymnastics, New Haven, Conn. July 9 to August 4.

N. A. G. U. FESTIVAL.

The 28th Festival and Golden Anniversary of the North American Gymnastic Union will be held in Philadelphia, June 20 to 25, 1900. The programme is as follows:

Wednesday, June 20: Morning, reception of visitors,distribu-

tion of badges, etc.; Afternoon, meeting of judges of competitions; Evening, official reception and "Festspiel."

Thursday, June 21: Morning, class competition; Afternoon, fencing, wrestling and club swinging, gymnastic games, exercises by the scholars of the gymnasium schools of Philadelphia and rehearsal of mass exercises; Evening, "Volksfest."

Friday, June 22: Morning, bicycle and relay races, individual competition in apparatus work and field sports; Afternoon, gymnastic games, exercises by the scholars of the gymnasiums of Philadelphia, etc.; Evening, "Volksfest," and golden jubilee.

Saturday, June 23: Morning, swimming contest; Afternoon, parade of all participating gymnastic societies, grand gymnastic exhibition; Evening, award of prizes and summer night festival.

Sunday, June 24: Excursion to Coney Island.

Monday, June 25: Excursion through the city and Fairmont Park, Wissahickon.

The following committees have been appointed:

Festival Director—Professor Richard Pertuch. Assistants—Hans Goetz, William Haar, John Bezner, William Ludascher, Dr. Joseph I. Smith, William Wieland, Otto Guenther, F. A. Finkeldey, Dr. D. M. F. Crogh, Fred. Boeckmann, Theo. Schneider, Jr., Carl Schrader.

Executors of the Festival Committee—H. D. Auer, president; H. Daehnert, first vice-president; Adolph Eckardt, second vice-president; Dr. George L. H. Haar, general secretary; H. G. Richter, recording secretary; Louis Grotz, Jr., treasurer.

Committee on Observation—Henry Braun and William A. Stecher, St. Louis, Mo.; George Brosius and H. Huhn, Milwaukee, Wis.; Dr. Carl Zapp, Cleveland, O.; H. Metzner and Carl Stahl, New York, N. Y.

Special Committee on Observation—Dr. D. A. Sargent, Cambridge, Mass.; Dr. E. M. Hartwell, Boston, Mass.; Dr. Ellis Foster, Dr. C. E. Ehinger, West Chester State Normal School, Pa.; Dr. Edward Brooks, Superintendent Public Schools, Philadelphia, Pa.; Dr. Grace E. Spiegle, Girls' Normal School, Philadelphia; Dr. F. Pfister, Milwaukee.

(MIND AND BODY, May, 1900.)

Gymnastic Reform in Hungary.—The following suggestions were submitted to the Executive Committee of Gymnastics:

1. To erect a normal school of gymnastics.
2. To give the professors of gymnastics the same rank as the professors of other branches of education.
3. To erect large and spacious rooms for gymnastic exercises for the pupils.
4. To organize a Central Committee on physical culture, and to establish the office of Gymnastic Inspector.
5. To endeavor to secure material assistance for the various gymnastic societies.

(MIND AND BODY, May, 1900.)

BOSTON ATHLETIC ASSOCIATION MARATHON RACE, APRIL 19, 1900.

For the fourth time this race was held on Patriots' Day, starting from a point one mile beyond Ashland, Mass., and finishing at the B. A. A. Clubhouse, a distance of 25 miles. This year the race was more interesting than usual on account of the running of the Canadian athletes, who won first, second and third places out of an entry of five men, and the first two men broke all existing records, the first man, Caffrey of Hamilton, Ontario, covering the distance in 2 hrs. 39 min. 44 2-5 secs., and the second man, Sherring of Hamilton, Ontario, finishing in 2 hrs. 41 min. 31 1-5 secs., both men breaking the old record of 2 hrs. 42 min. made in America, and the Greek record in 1896 of 2 hrs. 55 min. 20 secs. The runners had the wind behind them all the way, which helped them very much; the going for the men was considered good, as they took the sidepaths and sidewalks about all the way. Sherring led all the way to the Newtons, and at one time led the field about 1 1-2 miles, but finally was compelled to stop for a few minutes, but eventually finished in second place. Out of an entry list of 35, 29 men started and 26 finished, the leading men finishing in good condition, and the others, owing to lack of training, not getting a prize. Prizes were given to the first eight men, who finished as follows:

	H.	M.	S.
1. J. Caffrey, Hamilton, Ont.	2	39	44 2-5
2. W. Sherring, Hamilton, Ont.	2	41	31 3-5
3. F. Hughson, Hamilton, Ont.	2	49	08
4. J. B. Maguire, Cambridgeport	2	51	36 2-5
5. James Fay, Highland A. C.	2	55	07 1-5
6. T. Hicks, Cambridge	3	07	19 1-5

7. B. F. Sullivan, Cathedral A. C. 3 13 20 1-5
8. Dick Grant, Cambridgeport. 3 13 57

Proof has been furnished that B. F. Sullivan, who was supposed to have finished seventh, rode on a car part of the way, so he is not entitled to seventh prize, which goes to Dick Grant, and the eighth prize goes to E. Grusell, Jr., of the Pastime A. C. of New York. The thanks of the Club are due to Capt. Lombard and his efficient corps of assistants for their valuable services. Their task is not an easy one, and, moreover, it involves sacrificing a good part of the holiday.

MEDICAL REPORT ON MARATHON RUNNERS.

The competitors in the Marathon Race were examined by physcians immediately before the start and just after the finish. The results, in all but two instances, agreed with those obtained last year by Drs. Williams and Arnold. The points investigated were weight, pulse, temperature, respiration, heart and lungs, kidneys and blood pressure.

None of the competitors were disqualified for physical unfitness, though two men were permitted to run only on condition that they should not distress themselves severely. Both of these men finished. In a few other cases, before the start, the pulse rate was found to be above 100, and the mouth temperature from one to two degrees above normal, due perhaps to nervousness. Taken as a whole the competitors were in very good physical condition, and this fact, together with the favorable state of weather and roads, accounted for the large number who finished in good shape. The results were as follows:

WEIGHT. The loss of weight varied from 1 1-2 to 10 pounds, the average being about 6 pounds. Owing to the fact that it was necessary to use different scales at Ashland and at Boston, a slight error was possible, but probably did not exceed 1-4 pound. As a general rule the heavier the man the greater the loss of weight, though there were several exceptions to this, for instance, the man who lost 10 pounds weighed only 131 at the start. It is interesting to notice that of the 26 men who finished only one weighed more than 150 pounds at the start. The heaviest starter weighed 166 1-2 and he did not finish at all. Successful long-distance runners would therefore seem to be light-weight men.

PULSE. The pulse rate at the finish varied from 72 to 144, and its character from being weak and irregular to being strong, full

and perfectly regular. There were 7 cases in which the pulse was less than 100, but several of these men had finished some minutes before the pulse rate could be obtained, and it was undoubtedly quicker than this at the actual end of the run. The half dozen men who finished first had excellent pulses.

TEMPERATURE. The examination last year showed several cases of extraordinary subnormal temperature. 98.6 degrees is the average normal body temperature, and a drop of more than 1 1-2 degrees below this is unusual. A year ago a fall of 4 degrees and even 5 degrees was observed in some of the runners. These temperatures were taken in the month. This year both the mouth and the internal body temperature were taken simultaneously, and the results were extremely interesting. In 9 cases the mouth temperature was slightly subnormal, in no instance showing a diminution of more than 1.6 degrees. In every one of these cases, with a single exception to be spoken of later, the internal body temperature was increased, the difference being from 1.6 to 7 degrees. The highest internal body temperature was 104.4 degrees, and there were 13 cases in which it was 103 degrees or more. There was but one case in which the internal temperature was not above normal, and that man, as above stated, differed in several respects from all the other runners and showed symptoms which were at first a little alarming, but which passed away and left absolutely no unpleasant after effects. The fact that Patriots' Day was cold and wet in '99 and warm and dry in 1900, probably accounts for the difference in the temperatures.

RESPIRATION. The breathing rate was in every instance except one increased after the race, and varied from 20 to 52 at the finish, the average rate being about 35.

HEART AND LUNGS. The lungs did not show any abnormal signs of any consequence. The heart was in all cases dilated at the finish. The dilatation affected both the right and the left sides of the heart, and in one or two cases reached extraordinary limits.

There were few, if any, abnormal heart sounds or murmurs to be heard, though they were present in several cases after the race a year ago. The exhaustion of the men was excessive at that time, and much worse than was observed this year.

KIDNEYS. The effect on the kidneys was in every case one of severe irritation, as was shown by careful microscopic analysis.

The results of these examinations were of much technical importance, but would be of little interest to the general reader. It seems probable that this irritation disappears gradually, and in from two to five days the kidneys again assume their normal condition.

Blood Pressure. In every case the blood pressure was diminished, the examinations in regard to this point agreeing closely with the observations made by the sphygmograph upon the pulse. It was formerly considered that exercise increased the blood pressure.

The proprietors of the hotel at Ashland, the officials of the race, and the officers of the Association, gave the physicians every opportunity to complete the observations. The runners themselves, with few exceptions, also co-operated heartily in examinations which must at times have seemed rather tedious to the nervous and tired men. The physicians cordially appreciate and acknowledge this assistance, without which their investigations would have been at least incomplete, if not entirely impracticable.

The physicians taking part in the examinations were:—Drs. Strong, Larrabee, Scannell, Huff, Fulton, Cleghorn, McCurdy, Meylan, Connolley, Blake, Thorndike, and Frothingham. (From "The Unicorn," Boston Athletic Ass'n, May 15, 1900.)

Local athletic clubs and individuals interested in gymnastic's and athletics have formed an association in Baltimore called the Public Parks Athletic Grounds Association, having for its object the establishment of athletic grounds and exercising places and facilities in the various parks and open spaces of the city of Baltimore. As a result of the agitation by the Association, much has been accomplished as shown by a recent vote of the Park Board:

"This board approves of the declared objects of the Public Parks Athletic Grounds Association, which has made application to it for additional space and facilities in the different parks under its control, and while not now able to grant all the requests, it will from time to time and at its earliest convenience, having due regard to the means at its command, furnish such additional facilities as it considers reasonable and proper."

Already a number of playgrounds and athletic fields are being laid out.

The Tenth International Congress of Hygiene and Demography will be opened at Paris on the 10th of August, 1900.

The Congress will be divided into nine sections, of which eight are included under the title, Hygiene. The fourth section, Individual and Collective Hygiene, will discuss topics relative to early infancy, physical exercises, schools, hospitals, prisons and cremation. (LA GYMNASTIQUE FRANCAISE, April 15, 1900.)

Swedish organizations plan to take part at Paris in the following amateur contests:

A. EXHIBITION IN GROUPS:

1. Gymnastics.—A complete daily exercise according to the Swedish system of Ling; fencing, swimming (swiftness and depth); floating, rescuing, diving into water of different depths down to 15 meters.

2. Athletic Sports.—Leaping, high and long and over a bar; throwing of weights; throwing of disk; throwing of javelin; leaps upon horseback.

Pentathlon of five tests: (1.) Leaping; (2.) Casting of javelin; (3.) Foot race of 190 meters; (4.) Throwing of disk; (5.) Wrestling.

3. National game of ball and lawn tennis.

B. INDIVIDUAL EXHIBITIONS.—Fancy skating; bicycling—exhibition of speed without pacers; yachting—sailing a course on a river, and on the sea; horse sport, etc.

The February number of "l'Educazione Fisica Nazionale," published at Naples, contains an account of a conference at Clark University, Worcester, Mass., in which the physiologist, A. Mosso, took part. The American schools, Mosso says, are to be envied for their large gymnasia, their extensive lawns for games and races, and their splendid amphitheatres where ten thousand spectators may be present at the gymnastic exercises of the students.

Dr. Germain Sée, an eminent professor and member of the French Academy of Medicine, passes the following judgment upon certain well-known forms of exercise:

Football is a dangerous exercise without value. Lawn tennis is an innocent game. Foot-races are of moderate value. Races

with burdens merit thorough disapproval. Bicycling is a very remarkable exercise, but racing should not be encouraged since serious consequences to the heart and to those forces actively called into play are to be feared. Instead of popularizing these contests, therefore, we should restrain and prevent them.

Active and passive gymnastics ought to be encouraged in so far as they facilitate respiration and help the muscular system.

Fencing deserves the heartiest approval, as it develops the strength.

He apportions exercise appropriate for the various ages, sexes, individual constitutions, etc., as follows:

(a) For children up to 12 years of age, I prescribe very easy sports without effort, as lawn tennis. I permit quick walking, but not racing. I prohibit bicycling. If one goes beyond these prescriptions, the heart is dilated and weakened.

(b) For adolescents from twelve to sixteen or eighteen years, bicycling and rowing are excellent. Fencing should be moderate, and horseback riding insignificant in amount.

(c) For adults from eighteen to thirty-five or forty years of age, with a tendency to obesity or with large inflated, gaseous stomachs, bicycling is desirable since it decreases the bodily weight without diminishing the strength. For a large stomach it is useful though not always efficacious.

(d) For fleshy adults with thickening of the heart: The moment the heart is attacked and becomes fatty, bicycling is bad. Walking up an incline is preferable; and if at the same time one decreases the amount of food and drink taken, and abstains from alcohol in all its forms, this form of exercise may prove very efficacious.

(e) For affections of the heart: No one should be permitted a bicycle unless a careful examination of the heart has been made. I have seen, as I have shown at length in my book, *Sur le traitement physiologique du cœur*, the most grave accidents result in the case of those who have the least lesion of the heart. For them, bicycling should be absolutely prohibited.

(f) For persons with diseased lungs: Asthmatic patients may bicycle to advantage if the heart is sound, but consumptives cannot. In any case the patient should not be allowed to bend over.

(g) For persons with nervous disorders: Bicycling and hydrotherapy are very useful.

(h) For persons with feminine weaknesses: In the case of women in general, and of young girls with chlorosis or anaemia, bicycling is exceedingly injurious. Fleshy women may bicycle if they have no disease of the heart, blood or feminine organs.

(La Gymnastique Française, April 15th.)

A great educational reform is on the eve of being accomplished in Russia. The first attempt to make instruction obligatory will be made at St. Petersburg, and if the result is satisfactory, obligatory education will by degrees be extended to the fifty governments of European Russia. La Gymnastique Française, March 15th.)

INTERCOLLEGIATE STRENGTH TESTS.

The Intercollegiate Strength Tests for 1899-1900 resulted in the following relative rank of the contesting colleges according to the total number of points of their fifty strongest men: (1) Columbia, 59,489.4; (2) Harvard, 53,676; (3) Minnesota, 52,489.3; (4) Amherst, 49,953.5; (5) Wesleyan, 44,116.5. The fifty strongest men of the Intercollegiate Contest include twenty-five from Columbia, ten from Harvard, eight from Minnesota, six from Amherst and one from Wesleyan. The measurements of the first ten strongest men, also those of the fiftieth strongest man in the contest and the averages for the entire fifty, are as follows:

	NAME.	Age.	Height.	Weight.	Strength of Lungs.	Strength of Back.	Strength of Legs.	Push up.	Pull up.	Strength of Chest and Up. Arms.	Strength of R. F. Arm.	Strength of L. F. Arm.	TOTAL
1	H. F. COCHEMS, Harvard.	25	178.5	86.3	47	420	690	30	27	491.9	87	74	1809.9
2	R. W. ALLIS, Minnesota.	25.7	166	71.4	14.4	333	556	40	34	528	69	58	1558.8
3	J. O. TOBEY, Harvard.	23	166.4	66	36	280	550	47	32	521.4	74	70	1581.4
4	J. J. CATLIN, Minnesota.	19.7	171.5	66.3	15.4	408	648	17	15	212.2	67	66	1411.6
5	C. EASTMOND, Columbia.	20.3	166	64	12.5	370	495	36	28	409.6	65	55	1407.1
6	V. DE LA M. EARLE, Columbia.	19.11	170.2	64.1	17	320	575	34	20	346.1	70	72	1400.1
7	H. H. WEEKES, Columbia.	20	175	75.2	14.5	340	532	31	16	353.4	83	66	1388.9
8	F. A. COOK, Amherst.	22	173.8	75.2	41	308	720	16	11	203	49	58	1374
9	R. ANTHONY, Harvard.	23	179.5	64	29	260	530	33	32	416	74	60	1369
10	G. WELLES, Columbia.	21.11	170.5	75.2	14	385	525	22	17	293.2	78	72	1367.2
50	J. G. GROVE, Minnesota.	26.10	173.5	72.6	15.6	303	430	23	16	283.1	72	66	1169.7
	AVERAGE.	22.5	174.6	71.9	20.3	302	542.5	21	16.7	281.3	68.4	63.3	1278

Total Number of Points, 63904.5

ABSTRACTS.

The following extracts from the records of the School Committee meeting, April 24, 1900, are of interest: "Mr. Calderwood, for the Committee on Hygiene and Physical Training, to whom was referred, February 27th, a communication from the Boston Society for the Advancement of Physical Education, requesting permission to make a series of measurements of the height and weight of the Boston school children, beginning with the primary grades and continuing through the period of growth, reported that they have granted a hearing to representatives of the Society, and have very carefully considered the matter. Your committee fully agree with the statement that observations of this sort on the same individual at successive periods would be of great practical value from an educational, as well as a physiological standpoint, and welcome the advice and co-operation of the Boston Society for the Advancement of Physical Education, which they are assured will be willingly rendered, with respect to the manner in which the plan should be carried into effect, and in the arrangement and study of the facts to be collated, but feel that the actual measurements should be made under their own supervision by the Director of Physical Training, who is directly responsible to this board. Furthermore, as the value of observations of the nature under consideration will depend upon their continuance during a series of years, in a systematic and definite manner, your committee recommend the adoption of an amendment to the rules, the passage of which will be sufficient to ensure the successful carrying out of the suggestions made by the memorialists."

School hygiene has been a prolific topic for discussion in educational associations. The National Education Association has taken a very practical method of getting a clear exposition of the problems concerned, and a series of prizes have been offered for the best essay on school hygiene. The plan is to be administered by the following committee: President A. R. Taylor, State Normal School, Emporia, Kan.; Dr. William T. Harris, United States Commissioner of Education, Washington, D. C.; George

P. Brown, editor of "School and Home Education," Bloomington, Ill.; President William F. King of Cornell College, Mt. Vernon, Ia.; and Superintendent Aaron Gove, Denver, Colo. The regulations governing the awards are as follows:

For the best essay submitted on each of the following topics: the seating, the lighting, the heating, and the ventilating of school buildings, $200.

For the second best essay submitted on each topic, $100.

Each essay shall be limited to ten thousand words and shall be submitted in printed or typewritten copy without signature, but with name of author inclosed with it in sealed envelope and addressed to the chairman of the committee at Emporia, Kan. Three copies of each essay shall be submitted. They must be mailed not later than February 1, 1901. The essays and envelopes will be properly numbered for identification, and the former forwarded to three experts to be hereafter appointed by this committee. Each expert will be ignorant of the appointment of the others, and their combined judgment shall determine the award. Should no essay on any topic be found worthy of an award and publication, the committee reserve the right to withhold the prize.

The committee reserve the exclusive right for the National Educational Association to copyright the prize essays and to publish the same for general distribution.

The committee desire that each essay shall treat each topic independently and be complete in itself, no reference being made to statements contained in another essay. Generalities and speculations are not desired, neither are detailed technical formulæ and demonstrations.

Each essay should present concisely and comprehensively the problem to be solved and the scientific principles involved; should discuss briefly the construction of the school building as related to the problem of sanitation in general and to the specific subject of the essay in particular; should describe in detail sufficient for the apprehension of the average teacher the conditions and mechanisms by which the best results may be obtained; should include figures and diagrams illustrating general plan and principles involved; should set forth methods and devices for detecting defects and suggest remedies for the same in buildings already constructed; should give references to a few buildings where the system has been adopted; and should be supplemented by a brief bibliography of standard authorities on the subject discussed and

a short list of manufacturers of approved devices and supplies for carrying out the plans advocated by the author.

The essays on ventilation should include full suggestions concerning the use of disinfectants.

Should the awards on two or more essays be made to the same person, he will be permitted to revise and unify the manuscripts before publication by the committee.

Among the many papers read at the annual meeting of the American Climatological Association, held at Washington, D. C., May 1, 2 and 3, 1900, was one by Dr. J. Madison Taylor of Philadelphia, on "Exercises Suitable for Children Suffering from Heart Disease." Dr. Taylor stated that the embargo so often laid by the physicians on all kinds of exercise in cases of this sort was often actually injurious, and showed how frequently when these children have been allowed increasing amounts of activity an actual benefit results. Carefully selected exercises can be made to afford a large amount of relief to many of the distressing symptoms which acompany and follow upon disordered states of the heart. The writer defines exercise as "the normal use of the bodily parts, not merely of the muscular system, but particularly the interrelation of the viscera, abdominal and thoracic, and their mutual co-operation." Dr. Taylor then emphasized the necessity of standing erect, and of proper attitudes, and the value of enforced breathing after a definite system, the rules of which he gave. His experience with children has convinced him that the most remarkable results may sometimes be obtained by the simplest forms of exercise.

In the discussion of the paper, Dr. A. Jacobi of New York said that in both acute and chronic cases of heart disease, rest in bed was good, but that a watch must be kept that the rest was not prolonged too long. He agreed with the speaker as to the value of passive movements, and that the peripheral circulation can be fortified by some form of exercise. We must remember that in each individual there are from thirteen to fifteen square feet of skin, and if the circulation here is not attended to, the heart has to suffer. Massage is a good treàtment, but should only be done by a doctor or one who knows the courses of the blood and lymph channels. (From the BOSTON MEDICAL & SURGICAL JOURNAL, May 31, 1900.)

SUMMER PLAYGROUNDS IN CHICAGO.

The following suggestions for the organization and conduct of city playgrounds are taken from the report of William Noyes, Superintendent of Chicago Summer Playgrounds, 1899.

1. The apparatus should be located in one part of the yard, so that it can all be watched from one point. . . . Moreover, this arrangement leaves the rest of the yard open for free games.

2. The hours should be limited, either by opening the yards only for a few hours daily to idle school children, or that the force of custodians be sufficiently enlarged to have three distinct sessions a day for persons of differing ages. To compensate for narrow quarters, several custodians acting in concert need to conduct games and exercises with the utmost vigor, while the yards are open.

3. The duties of the janitors should be clearly defined.

4. The equipment, except such as can be borrowed, will need to be purchased outright. The yards are too well established and they are too evidently "supported by the city" to warrant further dependence upon donations of materials. Much of the delay in opening the yards this year was caused by the vain effort to secure donations of materials, such as sand, paving blocks, etc.

5. Provision for frequent excursions would add greatly to the popularity of the yards.

6. The amount of gymnastic apparatus should be increased, even at the expense of common swings. Apparatus to be especially recommended, includes the balance swing, the giant stride, the tan bark pit, the buck, the parallel and horizontal bars, climbing and traveling ladders, climbing poles, and plenty of clean sand. Though such apparatus, if well made, will be expensive, it is the only resource in the spaces available. Bathing apparatus might well be included under this head. The use of the bath tubs in the building was granted this summer, but they could not be used for lack of a special attendant.

7. The yards should be covered with something instead of sharp, dirty cinders. This would prevent much bodily injury and uncleanliness.

8. Still more attention to gymnastic work should be secured by employing trained gymnasts.

9. It would be a great advantage to the discipline of the yards if they were surrounded by high fences, so the presence of unde-

sirable persons could be prevented, the theft of small articles be stopped, and the apparatus be left out over night.

10. Consideration may well be given to the plan of opening the yards during the whole summer season, i. e., from May to October, the hours being confined to those after school, and only the children of a few rooms be admitted at a time. At present the yards are only well under way when they are stopped. The custodians only become acquainted with the children to say good-bye. Not only would this add greatly to the attractiveness of school, but tend to break up the clannishness of gangs.

11. A small sum of money might well be placed at the disposal of the custodians of each yard for the purchase of materials for constructive work.

12. It is highly desirable that any appropriation obtained from the city be made payable in some way so that the superintendent can give his attention to the yards, and not to the unraveling of red tape at city hall. (From "The School Weekly," Chicago, December 7, 1899.)

BOOK NOTICES AND BIBLIOGRAPHY.

A Review of Swedish Gymnastics, by Theodore Hough, Assistant Professor of Biology, Massachusetts Institute of Technology, Instructor in Physiology and Personal Hygiene, Boston Normal School of Gymnastics. Boston. Geo. H. Ellis, Printer, 1899. Pp. 41.

This reprint of a lecture given by Dr. Hough before the Boston Normal School of Gymnastics and the Physical Training Conference at Springfield, is an important contribution to the discussion of the theory of Swedish gymnastics. Although much of the lecture is devoted to generalities which are of little interest to one familiar with the literature of physical training, a number of disputed points are discussed with a surprising degree of frankness. Dr. Hough advocates corrective work in classes under the personal observation of the teacher rather than corrective apparatus work prescribed after examination, but perfomed individually under immediate observation, on the ground that the teacher must be able to observe quickly the individual movements of a large number of students. He claims that gymnastic drill, whether with or without apparatus, is the ideal form of gymnasium work. In uncontrolled play he sees the danger of stooping shoulders and contracted chest, which can be avoided only by some such corrective work as the Swedish system supplies. In short, it is upon this corrective aspect that he lays the most stress.

He says, "The most distinct feature of the Swedish work is the fact that it never loses sight of the corrective element. This is its primary purpose. Gymnastic movements which, though graceful in themselves, have a marked tendency to produce some anatomical fault, are rigorously excluded. Even those which, though not open to this criticism, only result in the ability to do some gymnasium trick of little or no use in practical life are relegated to a subordinate place." A need of kinesiology is fundamental for teachers of physical training, but it is to be studied by the teacher and not by the pupil upon the gymnasium floor. Swedish gymnastic teachers show the greatest theoretical knowledge

of kinesiology and the most successful application of that knowledge in corrective work. In this strength, however, is possible weakness in that teachers may forget that kinesiology is not the whole of physical training.

With commendable frankness Dr. Hough admits that "there are few fields which offer such opportunities for the successful exercise of all the qualities of a bore, as does that of Swedish gymnastics." He defends the Swedes for the possession of a system, and selects the "day's order" as the chief point of defense. Here again Dr. Hough makes an important admission. Recalling the fact that "Ling died in 1839, and it was not until 1860 or 1870 that the several discoveries of physiology began to be co-ordinated into a satisfactory body of scientific knowledge," he shows how impossible it was for the Swedish system to rest upon a satisfactory basis of physiology. He, therefore, cautions Swedish advocates against claiming a physiological basis for their system.

In spite of this serious defect, however, he considers that the Swedish system does achieve good results, and quotes in support of this a comparison between the entering junior and the graduating senior classes of the Boston Normal School of Gymnastics. He then takes up the following points of strength for the system: (1) Each group of muscles is exercised and becomes more perfect in function. (2) Muscles adapt themselves to the work of the skeleton, and the skeleton is brought into proper position. (3) the various neuro-muscular units are trained co-ordinately for the proper performance of movements, and hence the formation of proper habits of muscular action. (4) No difficult work is attempted without special preparatory training, that there may be a natural progress from the simpler to the more difficult exercises. (5) No movements are permitted which do not allow full, free, respiratory movements. (6) Voluntary control of definite movements with accuracy and precision is gained. (7) "Swedish gymnastics, properly done, produce in a high degree those general effects of exercise which favorably affect the health of the organism as a whole." The day's order is then analyzed.

The explanations of the various movements do not differ in any important way from those with which we are familiar, except that the claim that in strain bends and slow leg movements, an aspirating effect is produced on the blood through the stretching of blood vessels is ignored, while at the same time it is admitted that

back, abdominal, and lateral trunk movements may be given in any order.

The discussion of the slow leg and respiratory movements is illustrative of Dr. Hough's frankness. He says, "The reason usually given for this (for following severe exercise by these movements)—that 'the accelerated action of the heart must be normalized' and 'free respiration restored'—is unsatisfactory. The accelerated heart will, in point of fact, come back to the normal if the organism be left to itself, and free respiration will also be restored." He adds that the movements are not necessary in all cases, and are probably unnecessary is most cases.

The progression illustrated by the day's order is favorably commented upon, and the all-round co-ordination derived from it is contrasted with that derived under the method of giving directions to individual students for the use of apparatus for three or four months, and then giving new directions to the same students for more difficult work at the end of that period. The claim is made that "only in drill work can any proper system of daily progression be carried out successfully in large classes; and daily progression in large classes is a thing which . . . we have a right to demand of any gymnastic work which professes to be physiologically correct and practically available."

The two aims pre-eminently important in physical training are stated as follows:

"(1) The general effects of bodily exercise, including the acquisition of that amount of physical endurance which the special conditions of each individual life demand. I place this first, for it is the chief object of physical training.

"(2) Correction of physical faults, both deformities of the muscular and skeletal systems and deficiencies in the nervous control of the body. I have tried to show that this is rendered necessary by the specialization of life, and is especially necessary with that specialization which marks the period of development, and which may be summed up in the two words, the 'school desk.'"

"The primary purpose of the Swedish system of gymnastics is the second of these objects. . . .

"It does not entirely satisfy the demands of the body for general exercise. No gymnasium work does. The Swedish system is not all of physical training; and, if some of its advocates have claimed

that it is, such claims are merely the result of over-enthusiasm, and do not demand serious consideration."

On the whole, Dr. Hough's paper leaves one with a distinct feeling of disappointment. Many important and disputed points are touched upon in a general way and then dropped before any vital discussion is reached. The circumstances under which the paper was read are undoubtedly responsible for its unsatisfactory character, making it a partisan defense of Swedish gymnastics rather than a critical examination of its status and claims. It will be interesting to know whether Dr. Hough's admissions will go unchallenged by the orthodox advocates of the Swedish system.

G. W. F.

The School and Society, being three lectures by John Dewey, Professor of Pedagogy in the University of Chicago, University of Chicago Press, Chicago, Ill., 1899. Pp. 129. Illustrated. 75 cents. Cloth.

The topics discussed in the several chapters are: I, The School and Social Progress; II, The School and the Life of the Child; III, Waste in Education; IV, Three Years of the University Elementary School.

It is difficult to do justice to Professor Dewey's book in any review; it is so full of suggestion, so clear in its presentation, and so rich with the enthusiasm of a broad-minded teacher, that one can only appreciate it by reading it for one's self. It is, perhaps, at once the simplest and strongest plea that has yet been made in behalf of the child's right to a full opportunity for the development of his activities, and the clearest exposition of how these activities may be made to relate the child to all times, all peoples and all interests.

G. W. F.

The Elementary School Record. A Series of Nine Monographs, published by the University of Chicago Press, University of Chicago. Whole series, $1.25; single numbers, 15 cents. Professor John Dewey, Editor; Laura L. Runyon, Managing Editor.

The Record is published as an exposition of the work of the University Elementary School, conducted by the Pedagogical Department of the University of Chicago. The central idea of education through activity finds in this school a very consistent

expression, as is disclosed by the various numbers of the Elementary School Record which have come to hand (four). While the school provides for systematic physical exercise, there is much invaluable training of the neuro-muscular system in the manual training, drawing, modelling and general construction work, by which the motor activity of the child is related to his school work. As a result a high degree of co-ordination between sense perception and motor control should be established.

G. W. F.

Bibliography of Child Study for the year 1898. Louis N. Wilson, Clark University, Worcester, Mass. The Pedagogical Seminary, Vol. VI., No. 3, September, 1899. Pp. 386-411.

Mr. Wilson has added by this contribution 333 titles to the 641 titles published by him in the Pedagogical Seminary of April, 1898, and has thereby brought the bibliography up to the beginning of the year 1899. This addition during the year 1898, illustrates how rapid has been the publication of books and articles bearing directly or indirectly upon child study, and evidences Mr. Wilson's untiring industry in the cause of education. The bibliography is completed by a subject index which makes it an invaluable companion for the student and teacher. For the information of those who are not familiar with the original bibliography, it might be well to state that it includes the titles of books, aricles, pamphlets, reprints, etc., published at home and abroad, with the place and date of publication, followed by a critical note indicating the line in which it is specially valuable. The first instalment of the bibliography may be obtained as a reprint (price, fifty cents), on application to Mr. Louis N. Wilson, Clark University, Worcester, Mass. It is to be hoped that the present instalment will also be reprinted in pamphlet form.

G. W. F.

Bibliography of Education for 1899. Compiled by James Ingersoll Wyler, Jr., Librarian of the University of Nebraska, and Isabel Ely Lord, Librarian of Bryn Mawr College. Educational Review, April, 1900. Pp. 334-393.

This bibliography contains 618 references to books, articles and reprints upon educational subjects. They are classified according

to the Dewey Decimal System, and the list is preceded by an extract, slightly modified, of the outline of classification covering education from 370 to 379, inclusive. The alphabetical index of authors adds greatly to the value of the bibliography, since the distribution according to the Dewey system makes an arbitrarily confusing set of references.

The bibliography is planned to include a selected list of English titles and the better class of American publications for the year 1899. In some cases critical notes are added though these are less numerous than one could wish.

From the standpoint of physical education, the references are very meagre, as there are but 11 numbers and these are mainly unimportant contributions. The bibliography as a whole seems intended for the general reader, rather than for the specialist in education.

G. W. F.

Statistical Methods with Special Reference to Biological Variation. By C. B. Davenport, Ph.D., Instructor in Zoology at Harvard University (now Assistant Professor, University of Chicago). John Wiley & Sons, New York, 1899. 148 pages.

Dr. Davenport's preface indicates the scope of his work. He says: "This book has been issued in answer to a repeated call for a simple presentation of the newer statistical methods in their application to biology. The immediate need which has called it forth is that of a handbook containing the working formulæ for use at summer laboratories where material for variation-study abounds. In order that the book should not be too bulky the text has been condensed as much as is consistent with clearness."

Dr. Davenport discusses the following general topics: "On Methods of Measuring Organisms"; "On The Seriation and Plotting of Data and the Frequency Polygon"; "The Classes of Frequency Polygons"; "Correlated Variability"; "Some Applications of Statistical Biological Study." He also gives ten tables of formulae; constants and their logarithms; ordinates of normal curves, etc.; values of the normal probability integral; reduction of linear dimensions from common to metric system; first to six powers of integers from 1 to 30; squares, cubes, square-roots, cube-roots and reciprocals to 1,000; logarithms of numbers to 1,000; logarithmic sines, cosines, tangents and cotangents for each

minute of arc. The tables cover 105 pages and the text 42, including 3 pages of references.

Dr. Davenport's discussion is based on the higher mathematics, and while the use of the book does not demand a knowledge of the higher mathematics, yet probably there will be few unfamiliar with these methods who will be attracted to it unless under direct instruction. The discussion is brief, yet clear and simple. Unnecessary matters are omitted, and it is made, what was intended a working handbook which will ever be ready for convenient consultation and use. The prime motive of the book to facilitate and standardize the methods of studying biological variation is well fulfilled, though one misses references which might be expected to appear, as for instance, Dr. Boas's useful method of studying the correlation of characteristics.

The book will undoubtedly be popular with the biologist who comes to the subject with proper mathematical training.

G. W. F.

Proceedings of the Department of Superintendence of the National Education Association, at its meeting in Chicago, Illinois, February 27 and 28, and March 1, 1900. Pp. 122. 25c.

The topic, The Status of Education at the Close of the Century, is discussed by Professor Nicholas Murray Butler, President Charles W. Eliot, and Commissioner W. T. Harris. Other topics treated are: Two Opportunities for Improvement in the Administration of Graded School Systems, The Trail of the City Superintendent, The Superintendent in Small Cities, Alcohol Physiology and Superintendence, Obligations and Opportunities of Scholarship, How can the Superintendent Improve the Efficiency of the Teachers under His Charge? and The Superintendent as an Organizer and an Executive. A Supplementary List of Active Members who have joined the Association since the last published list is appended.

The discussion of immediate interest to us is that upon Alcohol Physiology and Superintendence, by Professor W. O. Atwater. Professor Atwater in a strikingly clear and strong paper, considered the whole subject of alcohol physiology in its relation to educational methods. His essential argument is that it is unnecessary to teach anything but the truth about alcohol, and that the teachers' emphasis should no longer be put upon the patho-

logical and physiological, but upon the moral, economic and social aspects of the question. Superintendent Dutton of Brookline, Mass., Superintendent Richard G. Boone of Cincinnati, Superintendent C. F. Carroll of Worcester, President Francis W. Parker, Chicago Institute, Professor D. L. Kiehle, University of Minnesota, Dr. G. W. Webster, Northwestern University Medical School, Chicago, Hon. Henry Sabin, Iowa, Superintendent Joseph Carter, Champaign, Ill., Dr. Winfield S. Hall, Northwestern University Medical School, Chicago, Superintendent C. G. Pearse, Omaha, Neb., Mrs. Mary H. Hunt, Boston, and Mrs. Jessie Willard Bolte, Winnetka, Ill, contributed to the discussion.

This discussion, covering 37 pages, is perhaps the most important that has taken place upon this topic, in that those who took part represented all points of view, including the parent's, the physician's, the professional temperance reformer's, the teacher's, and the physiological expert's. Although the opinions expressed differed, the difference was in general confined to the less essential aspects of the question. The vital controversy upon this subject may be considered, therefore, to be practically at an end, leaving unsubstantiated the claim frequently made by temperate extremists that all controversy would result in aiding the liquor sellers. It certainly would seem possible now for the teacher to feel free to use his discretion as to methods of instruction, and to feel confident of the general support of his constituency when he teaches that alcohol, although it may act as a food in the body, has no real food value for a healthy individual and preferably should never be used except as a medicine, and then only under the direction of a physician.

G. W. F.

The Eyes and Ears of School Children, by Frank Allport, M.D., Chicago, Ill. Pp. 30.

Topics: Refraction in Schools; Defective Eyesight in American Children; Tests for Defective Vision in School Children; Physical Defects in Pupils; The Eyes and Ears of School Children.

Dr. Allport reviews the history of the studies that have been made on the eyes of school children, and the methods by which such examinations have been conducted. He further details examinations which he himself has made and gives statistical re-

sults. Out of 25,696 children tested, 32 per cent. were deemed defective. In different schools in Minneapolis it was found that the percentage of defectives varied from 11 to 67 per cent., the latter occurring in poorly lighted and unsanitary buildings. Dr. Allport emphasizes the importance of the following questions which, if answered in the affirmative by the parent or teacher, determine the necessity of an examination by a specialist.

"(1) Does the pupil habitually suffer from inflamed lids or eyes?

(2) Does the pupil fail to read a majority of the letters in the number xx (20) line of the Snellen's Test Types with either eye?

(3) Do the eyes and head habitually grow weary and painful after study?

(4) Is the pupil probably 'cross-eyed?'

(5) Does the pupil complain of ear-ache in either ear?

(6) Does matter (pus) or a foul odor proceed from either ear?

(7) Does the pupil fail to hear an ordinary voice at twenty feet in a quiet room?

(8) Does the pupil fail to hear the tick of a good sized watch at three feet with either ear, in a quiet room?

(9) Does the pupil fail to breath properly through either nostril?

(10) Is the pupil an habitual mouth breather?"

G. W. F.

Sight and Hearing of School Children. Examination of the Public Schools of Wellesley, Mass., David W. Wells, M.D., Boston. Reprinted from the Journal of Education, February 15-22, 1900. Pp. 21.

Dr. Wells reviews critically the results already obtained from examinations and describes his own work at Wellesley. In the primary grades, of 318 examined, 14 per cent. only had normal vision; 71 per cent. were far-sighted or with far-sighted astigmatism, and 7 per cent. near-sighted or with near-sighted astigmatism. In the intermediate department, 26 per cent. were normal; 60 per cent. and 8 per cent. were respectively abnormal, as above. In the grammar department, 24 per cent. were normal; 53 per cent. and 12 per cent. were respectively abnormal as above. In the high school 23 per cent. were normal, 54 per cent. and 12 per cent. abnormal, as above. Of the total number, 685, examined, 22 per

cent. were normal, 63 per cent. far-sighted, etc., 9 per cent. near-sighted, etc., and 8 per cent. one eye near- and the other far-sighted.

G. W. F.

A Teachers' Course in Physical Training. A brief study of the fundamental principles of gymnastic training. Designed for teachers of the public schools. By Wilbur P. Bowen, Director of Physical Training, Michigan State Normal College, 1899. Ann Arbor, George Wahr, Publisher. 183 pp. 41 illustrations.

To the fact that there was no satisfactory guide in the principles of physical training for the use of teachers' classes, we are indebted for Mr. Bowen's little book.

The book is divided as follows: Part First—Chapter I, the Neuro-Muscular System, in which is discussed the general anatomy and physiology of muscle and nerve tissue, the nerve centres and fibres as distributed in brain and spinal cord and the general phenomena of neuro-muscular activity; Chapter II, the Vital Organs of the Body as Affected by Exercise; Chapter III, Posture, Age, Sex, etc., as Related to Health and Bodily Exercise. Part Second—Physical Training: Chapter I, the place of Physical Training in Education and its Chief Subdivisions; Chapter II, Plays, Games, and Athletics; Chapter III, Gymnastics, with a table of definitions of elementary gymnastic movements, commands and abbreviations alphabetically appended. Appendix, An Outline of Applied Anatomy. Bibliography, etc.

This is a welcome addition to the literature of physical training, and is a wholesome attempt to give a brief and clear exposition of modern theory and practice for the use of the ordinary teacher or pupil who does not plan to go exhaustively into the subject.

G. W. F.

MONATSSCHRIFT FÜR DAS TURNWESEN. Berlin, 1900. Vol. XIX.

No. 2 (February). The Third Hour for Gymnastics in the Higher Schools in Prussia (Results of an Inquiry Conducted by a Committee of the German Turnlehrer-Verein). English Athletic Sports and German Gymnastic Games—a reply to Dr. E. Witte (see No. 7-8, 1899) by M. Zettler (concluded in No. 3) Moritz Böttcher, on his Eightieth Birthday, by Carl Euler.

No. 3 (March). Gymnastics in the Swedish Public Schools,

by Dr. med. F. A. Schmidt (to be continued). Courses of Games for Male and Female Teachers, to be given in the year 1900. The Course of Games for Teachers given in Frankfurt a. M., May 15-20, 1899.

F. E. L.

DEUTSCHE TURN-ZEITUNG. Leipsic, 1900. Vol. XLV.

No. 6 (February 8). Professional Inspection in (School) Gymnastics (concluded in No. 7). Adolf Grahn, a True Turnwart (director of gymnastics), by Alfred Böttcher. Groups of Exercises with Long Wands, by Max Bartelt; and on the Double Horizontal Bar with Springboard, by Bernhard Striegler. Gymnastic Costume for Women, by Dr. Kurt Nagel. Exercises and Games of the Hawaiians (An extract. See also No. 13, p. 254).

No. 7 (February 15). Life Memories, by Carl Euler (continued in Nos. 8, 11, 13 and 15. See also No. 4). Exercises on the Horse with One Pommel, by C. Wehner. The Dresden Fencing Tournament, by M. H. K. The Italian National Game "Pallone."

No. 8 (February 22). A Popular Gymnastic Festival (at Leipsic), by Dr. R. Gasch (concluded in No. 9). Groups of Free Exercises, and Exercises on the Horizontal Bar, Horse and Parallel Bars, by Rud. Witzgall. Prof. Dr. R. Zander on Bodily Exercises of Girls and Women (quoted).

No. 9 (March 1). Moritz Böttcher, on His Eightieth Birthday, by Carl Euler. Groups of Marching and Free Exercises. The Third Hour for Gymnastics in the Higher Schools in Prussia (Results of an Inquiry Conducted by a Committee of the German Turnlehrer-Verein).

No. 10 (March 8). Preliminary Military Instruction in Switzerland, by Aug. Frei. Direktor Karl Kirchner and His Speech in 1830, on the Necessity of Reintroducing Bodily Exercises in the Schools (Gymnasien), by Karl Rossow (continued in Nos. 11 and 12). Obedience and Subordination, by Nawroth. Exercises in Tactics and with Wands, by H. Munier.

No. 11 (March 15). Groups of Exercises with Iron Wands, by I. Semmelhaack; and on the Horizontal Bar and the Parallel Bars, by Bernhard Striegler.

No. 12 (March 22). Division of Labor in the German Turnerschaft, by Wilhelm Winter. An Indian Club Reigen for Girls and Women, by Oswin Schumann.

No. 13. (March 29). Groups of Exercises with Iron Wands, by Bartelt. German and English Education (an extract).

No. 14 (April 5). How Can the So-called Higher Standing for Our Gymnastics be Won? by Dr. E. Burgass. The Gymnasium of the Olmütz Turnverein, by the Architect Max Löwe. May Reigen, by Fritz Heidecker. "Outpost," a New Indoor or Outdoor Gymnastic Game, by Erich Westphal. The XXVI. French Bundesturnfest in Paris (June 3 and 4, 1900), by Jos. Temming.

No. 15 (April 12). Adolf Schröder, by Dr. Hans Brendicke. Groups of Dumbbell Exercises for Women, by Th. Hellwig. Exercises on the Parallel Bars, by Paul Sievers. The Gymnastic Costume for Women, by G. Bormann. The Odessa Turnverein in the Year 1899, by Carl Reim.

No. 16 (April 19). How Far Is School Gymnastics Lagging Behind the Demands and Wishes of the Authorities, and How is the Condition to be Remedied? by Leo Albrecht. A Reigen with Wands (Gerstäben), by E. Dunkel. The Gymnastic Festival in Frankfurt, October 8, 1899 (to be concluded). Medicine Chests for Schools (A selected article). Free Exercises for the XXVI. French Bundesturnfest in Paris, June 3 and 4, 1900.

F. E. L.

MIND AND BODY, MILWAUKEE, WIS.

February, 1900: Free Municipal Baths in Boston, by W. I. Cole; Extracts from European Journals on Physical Training, W. A. Ocker; Obligatory Wand-Exercises for the 28th Festival of the N. A. G. U.; Indian Club Exercises, Karl F. Ross.

March: Physical Culture and Evolution, Hermann O. Dreisel; Gymnastic Festival, Philadelphia; Play Ball, David C. Gibson; Extracts from European Journals on Physical Training, W. A. Ocker; Jahn's Physical Training Club of Chicago; The Old-Fashioned Recess; Playgrounds for Children; A New Physical Education Bill in Ohio; Football and Development.

April: Physical Training, B. F. Boller; Athletic Fields, Figure Drill, Otto C. Mauthe; Abuses in Amateur Athletics; Indoor Snowball; Extracts from European Journals on Physical Training, W. A. Ocker.

CHILD STUDY MONTHLY, CHICAGO, ILL.

March, 1900: Common Diseases of Children, Harriet Brock-

way; What the Brain has to Do in Youth Besides "Getting Educated," T. S. Clouston, M.D.

April: Textbooks on Alcohol (editorial); Children's Literature, Harriet Brockway; On the Punishment of Children; School Doctors; The Physical Side of Education.

May: The Work of the Child-Study Department in the Chicago Public Schools, by Fred W. Smedley; Spelling in the Lincoln School at Omaha; A Plea for the Education of the Hand; Our Public Schools in Relation to the Parents and Homes of the Children; Puns in Shakespeare, Wm. O. Krohn.

THE DIETETIC AND HYGIENIC GAZETTE, NEW YORK, N. Y.

March, 1900: Mental and Physical Activity; The Physical Status of the Present Generation of Men; The Training of Woman; School Hygiene, G. D. Hamlin; Schools and Swimming Baths; Athletics in Public Schools, J. Gardner Smith.

April: Hygienic and Prophylactic Measures in Children, with Some Therapeutic Suggestions, by Louis Fischer, M.D.; The Care of the Eyes, A. D. McConachie.

May: Physical Culture for Health; The Place for Physical Training in the School and College Curriculum; Physical Training and Swedish Gymnastics; Weak Hearts; Breathing; How to Suppress Consumption.

EDUCATIONAL REVIEW, NEW YORK, N. Y.

April, 1900: Status of Education at the Close of the Century, by Nicholas Murray Butler; The Project of a National University; Bibliography of Education, 1899, by J. I. Wyer and Isabel Ely Lord.

May: Is the Curriculum Crowded? H. P. Amen; Judicious Aid to Pupils, W. G. Thayer; The Influence of Examinations, E. H. Nichols; The Crowded Curriculum; Adjustment of Education to Contemporary Needs, E. D. Mead; Education in the United States, N. M. Butler.

June: Alcohol Physiology and School Superintendence, W. O. Atwater; The Ethics of Getting Teachers and of Getting Positions, Andrew S. Draper; The California State Text-book System, Richard D. Faulkner; Better City School Administration, Trueman A. Deweese; The Report on Normal Schools, James M. Green; The Quincy Movement, Nicholas Murray Butler.

THE ELEMENTARY SCHOOL RECORD, UNIVERSITY OF CHICAGO, CHICAGO, ILL.

February, 1900: Principals of Education as Applied to Art, Lillian S. Cushman; School Reports.

March: Song Composition, Mrs. May Root Kern; School Reports (continued).

April: Textile Industries, Althea Harmer; The Psychology of Occupation, John Dewey; School Reports (continued).

May: Experiments in Plant Physiology, Katharine Andrews; Reflective Attention, John Dewey; School Reports.

THE JOURNAL OF PEDAGOGY, SYRACUSE, N. Y.

March, 1900: The Diet of School Children, John L. Heffron; The Culture Epochs Theory in Education, Edgar James Swift; The Better Articulation of our Educational System, M. V. O'Shea; Fatigue, Isabella I. M. Blake.

THE PEDAGOGICAL SEMINARY, WORCESTER, MASS.

April, 1900: Children's Ideals, Earl Barnes; On Some Psychical Relations of Society and Solitude, Maurice H. Small; Health Inspection in the Schools, Wm. H. Burnham; Foundations of Nature Study, C. F. Hodge; Studies in Imagination, Lillian H. Chalmers; How a Musical Education should be Acquired in the Public Schools, Max Meyer; Rights of Children, A Study in Juvenile Altruism, Will S. Monroe; Home Reading of School Children, Arthur P. Orving.

THE POSSE GYMNASIUM JOURNAL, BOSTON, MASS.

March, 1900: Medical Gymnastics (continued), Baron Nils Posse; The Treatment of Fractures by Systematic Movement and Massage without Immobilization; Common Sense Athletics (concluded); Dr. Jaeger's Suggestions for Gymnasium Suits (concluded), M. P. C.; The Daily Care of the Nerves, Anna B. Davis, M.D.

April: Editorial on the "Quincy Movement"; Medical Gymnastics (continued), Baron Nils Posse; The Daily Care of the Nerves (concluded), Anna B. Davis, M.D.

EDUCATION, BOSTON, MASS.

April, 1900: The Study of Arrested Development in Children

as Produced by Injudicious School Methods, by Wm. T. Harris, LL.D.

May: Scientific Temperance Instruction, by Hon. Henry Sabin, Des Moines, Ia.; Original Investigation in Normal Schools (continued), by Fred'k E. Bolton, Ph.D., State Normal School, Milwaukee, Wis.

The Elements of Physical Education. A Teacher's Manual, by David Lennox, M.D. and Alexander Sturrock, Dundee Public Gymnasium, Dundee, Scotland. With original musical accompaniments to the drill by Harry Everitt Loseby. Wm. Blackwood & Sons, Edinburgh and London, 1898. $1.00. 241 pp.

A Teacher's Course in Physical Training, by Wilbur P. Bowen, Director of Physical Training, Michigan State Normal College. Ann Arbor, Mich. George Wahr, publisher. 183 pp.

Helps to the Study of Classical Mythology for the Lower Grades and Secondary Schools, by Benjamin L. D'Ooge, Professor in the Michigan State Normal College. Ann Arbor, Mich. George Wahr, publisher. 1899. pp. 180.

The School and Society, John Dewey, Professor of Pedagogy in the University of Chicago. Supplemented by A Statement of The University Elementary School. Chicago, 1899. The University of Chicago Press. Pp. 129.

Fatigue Studies. A Discussion at the Teachers' Club, by Robert Burns, Clinton, N. Y. The School Journal, New York and Chicago, May 19, 1900.

Proceedings and papers of the Sargent Normal School Association, Season of 1899-1900. Papers: How to bring girls to the same point of enthusiasm for gymnasium work as for sports, by Alice B. Foster, M.D., Director, Gymnasium for Women, Oberlin College, Oberlin, O.; The place of out-door sports in the regular gymnastic training of girls, by Miss Harriet I. Ballintine, Director of Vassar College Gymnasium, Poughkeepsie, N. Y.; A discussion of the claims of Swedish gymnastics, by G. W. Fitz, M.D., Boston.

PUBLICATIONS RECEIVED.

Dietary Studies of University Boat Crews, by W. O. Atwater and A. Bryant, Washington Printing Office, Washington, D. C.

City and Town Supervision of Schools, by John T. Prince, agent of the Massachusetts State Board of Education.

Ladies' Home Journal, Philadelphia, Pa., April and May, 1900.

Supervision Data for Massachusetts, by Frank A. Hill, Secretary of State Board of Education, January 1, 1900.

Le Stand, Paris, France.

The School Journal, New York, N. Y.

Report of School Committee of the town of Andover, for the school year 1899. Andover, Mass., 1900.

Announcement for 1900 of the Summer School of Arts and Sciences of Harvard University.

Journal of Pedagogy, Syracuse, N. Y. March.

Ny Tidning för Idrott, Stockholm, Sweden.

Mind and Body, Milwaukee, Wis., March and April.

La Gymnastique Francaise, Paris, France.

Die Kinderfehler, Langensalza, Germany, March and May.

Child-Study Monthly, Chicago, Ill., March, April and May.

Sight and Hearing of School Children. Examination of the Public Schools of Wellesley, Mass., by David W. Wells, M.D., Boston.

Educational Review, New York, N. Y., March and April.

The Elementary School Record. University of Chicago Press, Chicago, Ill., Nos. 1, 2, 3 and 4.

Posse Gymnasium Journal, Boston, Mass. March and April. Press, Chicago, Ill.

Amerikanische Turnzeitung, Milwaukee, Wis.

Dietetic and Hygienic Gazette, New York, N. Y., April.

Educational Review, New York, N. Y., March, April, May and June.

The School and Society, by John Dewey, University of Chicago Press, Chicago, Ill., 1899.

Announcement of Summer Session of Columbia University, City of New York, N. Y.

Announcement of the Chautauqua School of Physical Education.

Pedagogical Seminary, Worcester, Mass., April.

Physiology and Temperance Instruction in the Public Schools of Massachusetts. The Report upon the compliance of towns and cities with Chapter 332 of the Acts of 1885, commonly known as the Temperance Law, by Frank A. Hill, Secretary, State Board of Education, Boston, 1900.

Announcement of Monteagle Summer School, Tenn., for 1900.

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THE DIGESTIBILITY OF PROTEIN IN BREAD.

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There is a popular impression in this country, fostered by cook-books, vegetarian clubs and the newspapers, that bread made from whole wheat flour is much more nutritious than bread made from ordinary white flour. This superior nutritive value, it is claimed, is due to the fact that the whole wheat flour includes the outer layers of the grain as well as the white inner portion. These outer layers are said to contain the larger part of the protein matter (gluten) of the grain, and therefore bread made from flour containing these outer layers would have a greater nutritive value than ordinary white flour. The object of this experiment, therefore, was not to determine the total nutritive value of the breads but merely to determine from which kind the body would absorb the most protein.

Recent scientific investigations in this and other countries have shown that while whole wheat bread contains more protein (gluten) than white bread, a smaller amount of it is absorbed by the body because the presence of the very layers which are so rich in protein so irritate and stimulate the worm-like movements of the intestines (peristalsis) that the food is passed along much faster than is the case with white bread. The whole wheat bread thus does not remain in the intestines long enough for the full amount of its available protein to be absorbed.

It was first thought that the irritating or stimulating effect of the whole wheat flour was due to the coarseness of the grinding. The outer parts of the grain were left in a coarse, flaky condition and these flakes caused the irritation of the intestinal wall and increased the peristaltic action. Since the first experiments were made, however, improved processes of preparing the whole wheat flour have been introduced, especially in this country, so that the whole wheat flour of today is almost, if not quite, as fine as white flour.

But in spite of the more finely ground flour corresponding results in favor of the white flour have been obtained in extensive investigations upon the subject in this country, notably at the Maine Experiment Station* in 1896 and 1897. These experiments were made by Mr. Chas. D. Woods, Director of the Station, and were performed upon eleven "young men with vigorous appetites and apparently normal digestion," and are in favor of white bread.

†"The experiments began in each case with a supper of milk with which each subject took six gelatin capsules filled with lamp black. For the two days following, the food eaten consisted chiefly of the bread under investigation. Butter was eaten with the bread, and the men were allowed milk and coffee with sugar. On the morning following the second day of the bread diet, the men again took lamp-black in capsules and a breakfast of milk, no solid food being taken until noon.

No attempt was made to limit the amount of food taken.

The experiments‡ show that bread and milk are more completely digested than bread alone."

The following table shows the results obtained:

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*14th Annual Report, Maine Experiment Station, Orono, Me., 1898. Pp. 173-207.

†Ibid. Pp. 177 and 181-192.

‡Ibid. Pp. 196.

TABLE NO. I.

No. of Expr.	Material.	Bread. Per cent. Nitrogen.	Bread. Per cent. Protein.	Feces. Per cent. Nitrogen.	Per cent. Protein Digested.
1.	White Bread	2.20	13.73	5.35	90.87
2.	White Bread	2.12	13.25	8.57	80.00
3.	White Bread	2.13	13.29	5.96	81.68
4.	White Bread	2.12	13.24	8.83	75.35
5.	White Bread	2.07	12.91	6.35	86.47
6.	White Bread	2.06	12.89	4.82	90.78
7.	White Bread	2.47	15.46	5.27	91.93
8.	White Bread	2.47	15.46	5.27	89.16
9.	Graham Bread	2.25	14.07	4.11	87.79
10.	Graham Bread	2.27	14.20	4.24	88.67
11.	Graham Bread	2.24	14.03	3.74	91.90
12.	Graham Bread	2.18	13.64	4.07	87.22
13.	Entire Wheat Bread	2.34	14.61	5.10	89.10
14.	Entire Wheat Bread	2.34	14.61	4.10	93.58
15.	Entire Wheat Bread	2.34	14.61	4.47	92.73
16.	White Bread	2.34	14.64	4.40	96.31
17.	White Bread	2.35	14.68	4.87	91.44
18.	White Bread	2.29	14.32	3.94	95.40
19.	White Bread	2.30	14.36	4.11	95.36
20.	Entire Wheat Bread	2.45	15.30	4.43	90.38
21.	Entire Wheat Bread	2.43	15.19	4.71	93.46
22.	Graham Bread	1.98	12.35	3.40	87.81
23.	Graham Bread	2.04	12.77	3.78	87.68
24.	White Bread	2.34	14.61	3.01	97.84

In the above experiments only four were made on bread alone. These four were on white bread and showed that the average digestibility of the protein was 81.97 per cent.

The following table shows the average digestibility of the different breads:

TABLE NO. II.

Average Digestibility.
(From Maine Experiment tables.)

Material.	Per cent of Protein digested.
White bread alone	81.97
White bread and milk	92.74
Graham bread and milk	88.59
Entire wheat bread and milk	91.85

Most of the important experiments made in Europe have been on rye bread or on flour different from that used in this country. Laboratory experiments on artificial digestibility of different breads have also been made, particularly by T. Lander Brunton and F. W. Tunnicliffe.* Their results are as follows:

Per cent of nitrogenous matter digested, calculated to total nitrogenous matter in water-free breads.

	White.	Brown.
(a) Gastro-pancreatic digestion:		
Ten hours gastric, six hours pancreatic....	74.89	60.71
(b) Pancreatic alone, eleven hours...........	79.38	69.61

The following are some of the conclusions drawn from their experiments:

"I. White bread is, weight for weight, more nutritious than brown bread. Therefore it appears the preference given by operators in large towns for white bread has, to a certain extent, a sound basis.

"II. In the case of people with irritable intestines, white bread is to be preferred to brown.

"III. In the case of people with sluggish intestines, brown bread is preferable to white, as it tends to maintain a regular peristaltic action, and insures regular evacuation of the bowels with all its attendant advantages."

The object of the author's experiments was to determine in a practical way what had already been demonstrated in the laboratory and to assist in accumulating data for further experiments on this subject. The time at the author's disposal, however, was so short that the investigations could only be carried out upon one person (the author himself) and the number of experiments limited as follows:

Kind of bread.	Number of Experiments.
Home-made white bread..................	2
Home-made whole wheat bread.............	2
Baker's white bread......................	2
Baker's whole wheat bread................	2

THE BREAD.

The home-made white bread was made in the ordinary way

*St. Bartholomew's Hospital Reports, Vol. xxxiii, pp. 157-168.

from "Gilt Edge" white flour raised with yeast. The baker's white bread was made by the Purdue Bakery from "Prairie Rose" and "Minnesota White Wheat" white flour raised with potato yeast, and "Yeast Foam."

The home-made whole wheat bread was made from the Franklin Mills whole wheat flour, raised with yeast; the baker's was made from Paxton Milling Company's gluten flour.

THE EXPERIMENTS.

The experiments were conducted for a period of twenty-four hours each. On the day preceding the experiment the last meal (supper) was made on bread and milk. On the day of the experiment the bread alone was eaten. The first meal following the day of the experiment (breakfast) was also made on bread and milk.

COLORING THE FECES.

Previous to beginning the digestion experiments several tests were made with charcoal and lamp-black as coloring matter for the feces, but as these substances produced considerable constipation in the subject they were abandoned, and unfermented grape juice substituted. The grape juice (about 200cc. with each meal), diluted with equal volumes of water, was drunk at each meal of bread and colored the feces a deep blackish green, which easily marked the difference between the characteristic milk feces and the bread feces. A period of two days' ordinary diet was allowed between the experiments.

SAMPLING AND DRYING.

To obtain a sample of the bread in each case the ends of the loaf were removed to a depth of one inch. The bread was then sliced, one slice was taken as a sample, and the amount eaten weighed.

The feces were deposited in tin boxes provided for the purpose. Both bread and feces were dried in an air bath at a temperature varying from 70° to 90° C. They were then exposed to the air of the laboratory long enough to cool thoroughly and weighed. The analyses were made on these partially dried samples.

ANALYSES.

Since the disputed point was as to the amount of protein material absorbed by the body, the only determination made was that of nitrogen. This was determined according to the well known Kjeldahl method as given in the Official Methods of the U. S. Dep't of Agriculture. The protein was calculated as 6.25 times the nitrogen obtained. To obtain comparative results the amount of nitrogen in the bile products, intestinal debris, etc., was not calculated, as it was assumed to be the same in all the experiments.

The following table gives a complete record of each experiment:

EXPERIMENT NO. I.

HOME-MADE WHITE BREAD.

Date. April.	Taken In.	Given out.
25.	For supper, 1.5 pints milk.	
26.	8.30 A. M.: 158.15 gr. bread; 150 cc. grape juice.	1.30 P. M.: Milk feces, medium, well formed.
	12.30 P. M.: 226.5 gr. bread; 150 cc. grape juice.	6.30 P. M.: Bread feces, black, somewhat dry, lumpy.
	5.30 P. M.: 193.334 gr. bread; 150 cc. grape juice.	Dry, 25.19 gr.
27.	For breakfast, 1 pint milk; other meals, ordinary diet.	10 A. M.: Bread feces, hard, black, lumpy. Dry, 13.93 gr.
		1 A. M.: Bread feces and milk feces.
28.		7 A. M.: Bread feces and milk feces compact, well formed. Bread and milk feces lapped but black and bread feces easily separated. Dry, 8,968 gr.

EXPERIMENT NO. II.

BAKER'S WHITE BREAD.

Date. May.	Taken In.	Given out.
2.	For supper, 1 pint milk.	
3.	8 A. M.: 125.80 gr. bread; 200 cc. grape juice.	3 P. M.: Milk and bread feces, very little bread feces, soft, not well marked. Dry, 5.705 gr.
	12.30 P. M.: 125.67 gr. bread; 200 cc. grape juice.	
	6 P. M.: 179.20 gr. bread; 100 cc. grape juice.	
4.	For breakfast, pint milk.	3 P. M.: Bread feces, medium, somewhat lumpy, black. Dry, 19.83 gr.
5.		8 A. M.: Large, soft milk feces with some black bread feces not well marked. Dry, 5.21 gr.

EXPERIMENT NO. III.

HOME-MADE WHOLE WHEAT BREAD.

May.	Taken In.	Given out.
6.	For supper, 1.5 pints milk and bread.	
7.	8 A. M.: 225.35 gr. bread; 200 cc. grape juice.	
	12.30 P. M.: 200 gr. bread; 200 cc. grape juice.	3 P. M.: Milk feces, medium, well formed, no trace of bread feces.
	5.30 P. M.: 225 gr. bread; 200 cc. grape juice.	
8.	For breakfast, 1 pint milk.	4 P. M.: Bread feces, medium, with little milk feces. Easily separated. Dry, 17.285 gr.
		11.30 P.M.: Bread feces, very soft, no milk feces. Dry, 19.56 gr.

EXPERIMENT NO. IV.

HOME-MADE WHITE BREAD.

May.	Taken In.	Given Out.
14.	For supper, 1.5 pints milk and bread.	
15.	8 A. M.: 205 gr. bread; 200 cc. grape juice. 12.30 P. M.: 207 gr. bread; 200 cc. grape juice. 5.30 P. M.: 191 gr. bread; 100 cc. grape juice.	No feces.
16.	For breakfast, 1 pint milk and bread.	8 A. M.: Milk and bread feces, medium, well formed, easily separated. Dry, 15.09 gr. 4 P. M.: Bread feces. Diarrhœa, good deal of mucus and brownish bile residue. Bread feces in dark green lumps in the fluid. Dry, 10.63 gr. 8 P. M.: Milk feces, no bread feces.

EXPERIMENT NO. V.

BAKER'S WHOLE WHEAT BREAD.

May.	Taken In.	Given Out.
17.	For supper, 1 pint milk and bread.	
18.	8 A. M.: 150 gr. bread; 200 cc. grape juice. 12.30 P. M.: 200 gr. bread; 200 cc. grape juice. 5.30 P. M.: 264 gr. bread; 200 cc. grape juice.	4 P. M.: Milk and bread feces, medium, well formed, easily separated. Dry, 7.15 gr.
19.	8 A. M.: For breakfast, 1 pint milk and bread.	3.45 P. M.: Bread feces, medium, well formed. Dry, 13.65 gr.

May.	Taken In.	Given out.
20.		10.15 A. M.: Milk and bread feces, bread medium, milk soft, easily separated. Dry, 10.69 gr.

EXPERIMENT NO. VI.

HOME-MADE WHOLE WHEAT BREAD.

May.	Taken In.	Given Out.
20.	For supper, 1 pint milk and bread.	
21.	7 A. M.: 210 gr. bread; 150 cc. grape juice. 12.30 P. M.: 236 gr. bread; 150 cc. grape juice. 5.30 P. M.: 221 gr. bread; 150 cc. grape juice.	10 P. M.: Milk feces, hard, lumpy; no trace of bread feces.
22.	For breakfast, 1 pint milk and bread.	2.30 P. M.: Milk and bread feces. A few hard lumps of milk feces, easily separated from the soft black bread feces. Dry, 20.50 gr.
23.		12.15 A. M.: Some bread feces with milk feces, very soft, almost diarrhœa. Dry, 6.84 gr.

EXPERIMENT NO. VII.

BAKER'S WHITE BREAD.

May.	Taken In.	Given Out.
24.	For supper, 1 pint milk and bread.	
25.	8 A. M.: 203 gr. bread; 200 cc. grape juice. 12.30 P. M.: 222 gr. bread; 200 cc. grape juice. 6 P. M.: 237 gr. bread; 200 cc. grape juice.	2.30 P. M.: Some of milk feces; no trace of bread feces.

May.	Taken In.	Given out.
26.	For breakfast, 1 pint milk and bread.	1.20 P. M.: Bread feces with trace of milk feces in hard lumps, easily separated. Dry, 16.42 gr.
27.		9 A. M.: Bread and milk feces, soft, not easily separated. Dry, 2.73 gr.

EXPERIMENT NO. VIII.

BAKER'S WHOLE WHEAT BREAD.

May.	Taken In.	Given Out.
26.	For supper, 1 pint milk and bread.	
27.	7.30 A. M.: 207 gr. bread; 200 cc. grape juice.	
	1 P. M.: 225 gr. bread; 200 cc. grape juice.	2.30 P. M.: Milk feces, but no trace of bread feces.
	7 P. M.: 229 gr. bread; 200 cc. grape juice.	
28.	For breakfast, 1 pint milk and bread.	9.45 A. M.: Bread feces, medium, well formed, no trace of milk feces. Dry, 14.32 gr.
		3.15 P. M.: Bread feces, medium, well formed, no trace of milk feces. Dry, 12.775 gr.
29.		9.30 A. M.: Milk feces, only a trace of bread feces, soft and not well marked. Dry, 2.5 gr.

TABLE NO. III.

No. of Expr.	Date.	Kind of Bread.	Amount Eaten.	Per cent. Water.	Per cent. Nitrogen in dry Sample.	Per cent. Protein in dry Sample.
1.	April 26.	Home-made White.	577.984 gr.	29.75	1.5489	9.6806
2.	May 3.	Baker's White.	430.67 gr.	28.30	2.1570	13.4812
3.	May 7.	Home-made Whole Wheat.	650.35 gr.	20.75	2.3032	14.3950
4.	May 15.	Home-made White.	603.00 gr.	26.08	1.8443	11.5268
5.	May 18.	Baker's Whole Wheat.	614.00 gr.	29.01	2.2664	14.1650
6.	May 21.	Home-made Whole Wheat.	667 gr.	36.80	2.1335	13.3343
7.	May 25.	Baker's White.	662 gr.	29.84	2.4568	14.4181
8.	May 27.	Baker's Whole Wheat.	661 gr.	34.43	2.5756	15.1312

TABLE NO. IV.

Percentage Composition per Grain of Dry Matter of Bread and Feces.

No. of Expr.	Material.	Bread. Per cent. Nitrogen.	Bread. Per cent. Protein.	Feces. Per cent. Nitrogen.	Per cent. Nitrogen Digested.
1.	Home-made White.	1.5489	9.6806	6.4189	65.56
2.	Baker's White.	2.1570	13.4812	6.9637	70.91
3.	Home-made Whole Wheat.	2.3032	14.3950	6.4023	76.22
4.	Home-made White.	1.8443	11.5268	6.5807	80.60
5.	Baker's Whole Wheat.	2.2664	14.1650	7.0913	78.70
6.	Home-made Whole Wheat.	2.1335	13.3343	6.3090	84.24
7.	Baker's White.	2.4568	13.3550	7.1045	88.43
8.	Baker's Whole	2.5756	16.0975	7.5192	86.79
		Average.			
	Home-made White.	1.6966	10.6037	6.4998	78.08
	Home-made Whole Wheat.	2.2183	13.8646	6.3556	80.23
	Baker's White.	2.3069	14.4181	7.0913	78.70
	Baker's Whole Wheat.	2.3910	15.1312	7.3052	82.74

Table No. III gives amount of bread eaten in each experiment and the percentage of water, nitrogen and protein in each. Table No. IV gives the percentage of nitrogen in both the bread and feces of each experiment together with the per cent of nitrogen digested. Contrary to expectation this table shows that the whole wheat bread is more nutritious than white bread in both the home-made and the baker's samples. It also shows that baker's bread is more digestible than home-made bread. The baker's white bread was only slightly more digestible than the home-made white bread (.62 per cent), but the baker's whole wheat bread was noticeably more digestible than the home-made whole wheat (2.51 per cent). Neither the home-made nor the baker's white bread was as completely digested as in the Maine experiments on white bread alone, and the addition of milk in the other Maine experiments shows a marked increase in the digestibility of both kinds of bread. (Compare Tables No. II and IV.)

TABLE NO. V.

TIME OF DIGESTION.

No. of Expr.	Material.	Bread Feces. First Trace in Feces. hr. m.	Main Quantity. hr. m.	Last Trace. Total time. hr. m.	Average. (Total time Divided by 3.) hr. m.
1.	Home-made white	10-0	25-30	46-30	15-30
2.	Baker's white	7-0	31-0	48-0	16-0
3.	Home-made whole wheat	...	32-0	39-30	13-10
4.	Home-made white	24-0	32-0	36-0	12-0
5.	Baker's whole wheat	8-0	31-45	50-15	16-45
6.	Home-made whole wheat	15-0	31-30	40-45	13-35
7.	Baker's white	...	29-20	49-0	16-20
8.	Baker's whole wheat	...	26-15	50-0	16-40

AVERAGE TIME.

	Hrs.	Min.
Home-made white	13	45
Home-made whole wheat	13	27
Baker's white	16	10
Baker's whole wheat	16	42

TOTAL AVERAGE TIME.

Home-made bread	13	30
Baker's bread	16	16

With regard to the stimulation of peristalsis by the whole wheat bread, Table No. V shows this to be true in the case of home-made breads by a narrow margin (18 minutes), but in the case of the baker's breads the whole wheat remained the longer (32 minutes). These times are so close, however, that too much importance should not be given to them although they are the averages. Many things tend to lessen the time during which the bread remains in the digestive tract, especially the character of the food eaten immediately after the experiment is over. Thus, fruit, sauce, etc., eaten immediately after the experiment, has a laxative effect and tends to hurry the last trace of the bread, though thus lessening the total time of digestion. Exercise, especially that involving considerable work, tends to accelerate the passage of the food.

The superior digestibility of the baker's bread (See Table IV) can be readily accounted for by the fact that it remained in the digestive tract on an average of nearly three hours longer than the home-made breads (see Table No. V). These times of digestibility, 13 hours, 30 minutes and 16 hours, 16 minutes respectively, for home-made and baker's breads, are nearly twice as quick as the accepted average standard of 36 hours. But the fact that the diet was not a mixed one and the bulk comparatively small may help to account for it. The grape juice used as coloring matter might also have had a laxative effect. The author was not in actual training at the time of the experiments, as the gymnasium season was over for the year when the experiments were begun, but he was in good condition and took an ordinary amount of exercise such as walking, riding a wheel, etc. His digestive system has always been in good condition and constipation is unknown. These facts may serve to explain why the digestion was accomplished in about half the average time.

CONCLUSIONS.

In drawing conclusions from the above tables it must be remembered that the experiments were few in number and limited to one individual, and the factor of the personal equation might well be a large one. Therefore it could not be asserted that the

results here obtained would apply to everyone, but the margin in favor of the nutritive value of the whole wheat bread, and especially the baker's, is so considerable that we are forced to disagree with the conclusions of Mr. Woods* (page 222) and also with those of Messrs. Brunton and Tunnicliffe.†

These experiments tend to show that the popular impression is correct and that more nutritive material (protein), weight for weight, is absorbed from whole wheat bread than from white bread; also that baker's bread is more nutritious than home-made bread.

The above experiments are preliminary to more elaborate experiments which the author hopes to carry out in the near future.

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*14th Annual Report, Maine Exp't Sta., Orono, Me. 1898. Pp. 173-207.

†St. Bartholomew's Hospital Report, Vol. xxxiii, pp. 157-168.

PHYSICAL CHARACTERISTICS OF THE RUNNER AND JUMPER.

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The object of this report is to present some physical differences which the successful track athlete possesses, and which are the basis of his superiority.

To note these differences of bodily structure, it is necessary to obtain the various measurements of typical athletes, and compare these with the average measurements of thousands of students, which have been compiled at some of the large universities and colleges, where the interest and facilities are adequate. Comparison is also made with the typical man as represented by the proportions of the male figure in art, handed down by the ancient Greek model which today represents the basis of human proportion for artists. It is not necessary in this presentation to make the comparison in detail with the results of more than one representative university, as the result is practicially the same in each one where measurements have been classified. The results at Yale University have been chosen as typical of the other institutions, the information and averages being kindly furnished by Dr. Jay W. Seaver, the head of the physical training department at Yale.

Twenty-three hundred students were measured between the ages of sixteen and twenty-seven. Forty-three measurements of different parts of the body of each individual were taken and recorded. Averages were then made of all these measurements, and the first column in the following table represents the average (as this is a popular treatment of the subject, the word "average" is used as a general term for the distinctions known to experts as "mean," "50 per cent" and "average") of all these students. The second column contains the average measurements of the five Michigan Agricultural College winners of first places in the following events in the Michigan Intercollegiate Athletic Association, the two winners in the bicycle races not being included: running high jump; pole vault; running broad jump; half mile run; mile walk; hop, step and jump; standing broad jump; 16 lb. shot.

All the jumps were won by two men, both of whom are also good runners, and who started in the 100-yd., and 220-yd., races. One took second in the 220, the other third in the 100.

The shot putter was tied for first place with another M. A. C. student, whose measurements I could not get. The one measured is a good jumper also, inclining more to the build of a jumper and runner than to the common idea of a weight thrower.

Table I shows the average measurements for heights— 67.8 inches (Yale, 50 per cent class), and 69.8 inches (Yale, 20 per cent) of Yale students. The average measurements of the five M. A. C. successful athletes are given in the middle column.

TABLE I.

	Yale.	M. A. C.	Yale.
Height	67.8	69.9	69.8
Weight	139.	144.6	153.
Sitting height	35.8	36.	36.9
Length leg (ground to pubis)	33.6	35.9	35.1
Length to knee	17.6	19.2	18.2
Arm stretch	70.	73.4	72.4
Breadth of shoulders	16.	16.7	16.7
Breadth of hips	12.7	13.	13.3
Breadth of chest	10.7	11.2	11.5
Depth of chest	7.4	7.9	7.7
Girth of neck	13.8	14.3	14.4
Girth of chest inflated	35.8	38.7	37.6
Girth of waist	28.7	30.5	30.3
Girth of hips	35.3	37.	36.8
Girth of biceps	11.6	11.9	12.4
Girth of R. upper arm	10.	10.5	10.7
Girth of L. upper arm	9.8	10.6	10.5
Girth of R. forearm	10.3	10.7	10.9
Girth of L. forearm	10.	10.6	10.5
Girth of R. wrist	6.4	6.9	6.7
Girth of R. thigh	20.3	21.2	21.4
Girth of L. thigh	20.	20.9	21.2
Girth of R. calf	13.8	14.	14.5
Girth of L. calf	13.8	14.	14.5
Girth of L. instep	9.1	8.8	9.5

1. We find that the average M. A. C. track athlete is over two inches taller than the average student, only 20 per cent being as tall, while he is considerably under weight according to his height. This gives the athlete the advantage of height without the extra weight of the average man, while at the same time he has greater strength and activity by reason of his training.

2. The sitting height, or length of body, is significant, as the athlete shows a body nearly one inch shorter than the student of the same height, while it is only slightly longer than in a man who is two inches shorter in total height.

3. The leg lengths are correspondingly greater in order to make up the equal height of the man in the third column, amounting to eight-tenths of an inch. For athletic purposes, especially in running, jumping and walking, this gives him a decided gain over the average man, as even a quarter inch longer reach at every stride would win any race, other things being equal.

4. But perhaps the most striking and significant difference is found in the length of the lower leg, which in the athlete is just one inch longer than in the average student of the same height. According to the entire length of his own leg, his lower leg is very much longer in proportion to his thigh.

If the upper and lower legs were in proportion, according to the lower leg, he would have the astonishing length of thirty-eight and four-tenths inches as his leg measure. Or, to reverse it, if the lower leg had the same proportion as the upper, according to the Greek or art proportions, his leg would be only thirty-three and four-tenths inches long, or less than the average for a man two inches shorter in total height.

We find, then, that the extra length is not equally divided between the thigh and the lower leg, but that the thigh is actually two-tenths of an inch shorter than that of the average man of equal height, and the lower leg a full inch longer.

A longer lower leg and a shorter thigh, provided the thigh muscles are developed properly, gives an athlete a quick acting upper leg and a long reach with the lower, thus providing at the same time for quickness and reach with the least expenditure of strength. The latter point is easily seen when it is considered that a runner brings his leg forward and upward with the knee bent, and then throws his foot forward with a long reach from the knee action, somewhat similar to the front legs of a trotting horse.

The most phenomenal athlete in the United States today has these characteristics of leg length to such a marked degree that they are plainly evident to the sight in his full-length pictures.

5. The arm stretch is also an inch longer, and three and a half inches longer than his own height. The height and arm stretch should be the same according to the art table of proportion. An extra long reach of arm gives the athlete a longer and therefore more powerful swing in both running and jumping, while its advantage in a weight thrower is especially useful.

6. While the shoulders are of equal breadth, the hips are three-tenths of an inch narrower than in the Yale man. We would naturally expect that the circumference of the hips would also be less, but we are surprised to find that the M. A. C. hip girth is actually larger than the average student of equal height. This is owing to the development of the muscles of the hip and thigh consequent upon training and the unusual arrangement of the muscles. Narrower hips with a large circumference give the athlete less weight of bone with a greater muscular power in proportion.

7. The athlete's chest is slightly narrower, but yet somewhat deeper than the average. This shows a more rounded form of chest than the average, denoting good depth of lung and freer action of the heart.

8. The chest inflated gives a difference of over an inch in favor of the athlete. The comparison of the chest contracted could not be made, as one list gave the chest as natural and the other as contracted. But considering that the breadth and depth of chest added together gives one-tenth of an inch in favor of the average man, the athlete shows a decided increase of chest mobility and consequently of lung power over the former. This we would undoubtedly expect and demand in an athlete.

9. The waist is actually larger than the average. This at first sight appears to be inconsistent, as ordinarily a considerable portion of adipose tissue is deposited around the waist if anywhere, and an athlete in good trim would naturally be expected to lose the greater part of this, making the waist smaller.

But when one thinks that every time the knee is raised in running, and especially in jumping, the abdominal and waist muscles are strongly active, he readily sees that the fat gives way to good muscular tissue. This is so in a marked degree with the athlete who won the mile walk. His waist and abdominal mus-

cles were developed to such an extent that the waist line was hardly visible; and there was scarcely any difference between the width of his chest and his waist.

10. The arm girths are in general smaller than the average. Here is one place where a large girth does not help an athlete, but rather would be extra weight, except in a weight thrower.

11. The thighs are nearly as large as the average, while the calves are considerably smaller. This is a peculiarity shown by the majority of jumpers and runners.

The thigh muscles are the chief muscles of the body for running and jumping, and I have often seen extreme cases of first-class athletes whose calves were thin and poorly developed and shaped, while their thighs were fully developed and shapely.

Another fact in connection with the origin and insertion of muscles is of as much importance as girth or extra length of leg. For example, in the majority of our athletes, and especially in the walker, the upper side thigh muscle, the *tensor vaginae femoris,* arises higher up and farther back on the crest of the ilium than usual, so that it entirely covers the trochanter or "hip joint." This gives added power and endurance. In exceptional cases where extra length of the bony structure at special points is lacking, a peculiar origin and insertion of different and strategic muscles give the basis for the superiority; but when taken in connection with the extra length of certain bones, then we have an exceptional athlete.

12. The instep is smaller to quite a marked degree, denoting small bones for the leg, which, together with the narrow hip, makes for extra lightness of the lower part of the body, and is another decidedly strong point of advantage. The athlete has a light, well muscled leg and hip, and the power is placed just where it is needed, above the knee. The typical track athlete, then, is one, who, while training and developing his full strength, has little extra weight in places where it would be a burden; who has great flexibility of chest, has sound lungs, heart and other vital organs; who has extra long arm stretch and length of leg, particularly the lower leg; who has a small bony structure as regards girth, especially from the hips down; and who has muscles so situated and developed, that he can make the best possible use of his unusual build, so as to excel in those lines of athletics for which nature has so peculiarly fitted him.

No claim is made that the results or conclusions herein ob-

served are final, for it would require the average of a large number of measurements of special athletes to arrive at the type. Runners and jumpers would have to be classified by themselves, weight throwers by themselves, and so on through the whole list of special athletics.

The results shown in this paper are meant to be suggestive; but at the same time, when sufficient and actual measurements and observations have been taken so as to designate the type of the runner and jumper, I believe it will show the same characteristics as outlined above, in spite of the exceptions. In my own experience, in the measurements of various other successful runners and jumpers, I have found the very same characteristics of structure without any deviation, except as to degree. I believe there is a type for each class of athletes, and that a man cannot, simply by practice, be a first-rate athlete as compared with the one who is peculiarly built, and who has equal training, no more than an ox can compete with a deer in running, or a calf with a kangaroo in jumping.

The athlete is born and the trainer makes him what he is. An athlete's build cannot be accounted for in the same way as that of trotting horses today. An athlete is a sport from an average stock, and cultivated. He has no pedigree and probably will not be the founder of a new line.

No trainer can take a student of perfect health and average proportions and make an intercollegiate winner out of him. There is a standard draught horse and a typical race horse, but the types are entirely different; so with an athlete. One could just as sanely compare a race horse with a draught horse as a track athlete with the average man. The athlete is a type by himself, the average man another.

The student takes an interest in certain lines of athletics, because he was born with certain peculiarities of bodily structure that enable him to excel his fellows. This is perfectly natural, for every one takes an especial interest in the thing he can do best, and what he can do best he is specially fitted for by birth.

We recognize this principle in all other affairs of life, and men specialize along definite lines; in fact, he who does not specialize does not make a success of anything in this generation.

I make no plea for the professional athlete, for he has done more harm than good to athletics. I want to see no college man

pursue track or other athletics as a livelihood, for it is hardly possible for a professional athlete to maintain his integrity of character. Besides, he could use his energy to better purpose in some regular line of manual or intellectual industry.

But I do make a plea for the legitimate sport of our colleges and other institutions fostering amateur athletics, where a young man, finding himself possessed of certain physical powers, chooses to seek his recreation in that for which he is specially fitted, and after pursuing a regular and healthful course of training which enables him to excel still more, contests for the supremacy of his college, thus affording at once a healthful recreation for himself, a stimulus to pure athletics, and a promotion of college loyalty.

It is more commendable in a college student to engage in athletics in a proper way than for him to be a grind and not take regular exercise.

I may have given the impression to some that because athletes are born, therefore the number who can engage with a prospect of success is necessarily small. But the fact is that far more than are supposed are out of proportion in such a way as to render them capable of excelling the average, if they only knew it. Those who do excel have found out their power, others only need to find it out and develop it. A much larger number than at present could engage in athletics with interest, pleasure and a chance of success. Part of the work of a trainer is to discover and develop new material. There are comparatively few who could not become proficient in some line of general athletics, including tennis, while all can take systematic body building and straightening work in the gymnasium.

Many men claim that the all-round contest ought to be engaged in to the practical exclusion of the special contests, as it provides for all-round development and power.

An all-round athlete is the ideal athlete, but the fact is that very few are fitted naturally to be all-round men, and the proportion of such to special athletes is exceedingly small. A far larger number can engage in special athletics with more interest and success than could possibly be the case with all-round work.

The all-round ideal is a beautiful thing, but approximately possible to only a very few; the special athlete is possible to the many.

If most special athletes could be easily developed into all-

round men, I believe there would be universal all-round contests. To me it is rather pitiable to see a good runner or jumper, not built for weight throwing, and who could never by any possibility develop into even an average contestant, try to qualify in the shot-put or hammer-throw in an all-round contest. I do not minimize the importance of the all-round contest for those who are able to undertake it, but I do not like to see a slight-built athlete straining and doing himself an injury by competing in events for which he is not and cannot be fitted.

The "all-round" is a noble contest for nobly built men. But special athletic contests are just as noble, in my mind, for those who have special powers; for the latter make better records with less strain than the former.

Therefore, I make the claim that in order to get the largest number of students actively interested in athletics, the specializing in athletics must continue and develop, simply because the facts are in favor of it, and the results are more beneficial. I would not like to see a draught-horse racing with a trotter, or the latter hitched up with the former in front of a load; no more do I like to see it in athletics. Without doubt I would much rather see a finely proportioned well muscled figure in the special athletic contests; but if they cannot do nearly so well as the men who are not in proportion, are we to keep the latter off the track? A special athlete is out of proportion, not so much in the girths, as in the bony structure and peculiar origin and insertion of various muscles; and these are the things which cannot be materially changed by any system of physical training or otherwise. Until we are all cast in the same mould, the special athlete is and always will be with us.

The second table of averages with which we will make a brief comparison is the Greek table of art proportions, which are the standard today for the art schools. The table is compiled from various sources, the two chief being Jonathan Scott Hartley's "Anatomy in Art" and Vitruvius' work on the Greek rules of proportion.

The rules are based upon the length of the head, measured from the base of the chin to the vertex.

1. The height of the figure should be eight heads.

2. The pubis is the center of the body, or four heads to each extreme.

3. From the sole of the foot to the knee is two heads.

4. From the knee to the pubis, two heads.
5. From the pubis to the nipple, two heads.
6. From the nipple to the top of the head, two heads.
7. The breadth of the shoulders, two heads.
8. The breadth of the hips, one and one-half heads.
9. From the point of the shoulder to the point of the elbow, one and one-half heads.
10. From the point of the elbow to the first knuckles, one and one-half heads.
11. From the point of the elbow to the finger tips, two heads.
12. The outstretched arms, eight heads, just equal to the height.
13. The hand is one-tenth of the height.
14. From the base of the chin to the roots of the hair is one-tenth of the height.
15. The foot is eleven inches long.

This table would be useless for our purpose unless we had an average head reduced to modern measurements. Hartley tells us that the average head is eight and three-quarters inches long.

The above set of rules according to this unit is as follows.

TABLE II.

SHOWING A COMPARISON OF THE AVERAGE M. A. C. TRACK ATHLETE WITH THE PROPORTIONS OF THE HUMAN FIGURE ACCORDING TO THE STANDARD OF THE ANCIENT GREEK OR MODERN ART:

	Greek.	M.A.C.
Average height	70.	69.9
Arm stretch	70.	73.4
Length to pubis (length of leg)	35.	35.9
Pubis to top of head	35.	34.
Pubis to knee (length of thigh)	17.5	16.7
Knee to ground	17.5	19.2
Width of hips	13.1	13.
Width of shoulders	17.5	16.7
Acromion to elbow	13.1	
Elbow to first knuckle	13.1	
Elbow to finger tip	17.5	
Length of hand	7.	
Length of face (From chin to roots of hair.)	7.	
Length of foot	11.	

We find, according to the Greek standard, that the M. A. C. track athlete is practically the same height, while his arm stretch is three and four-tenths inches longer. His total length of leg is nearly an inch longer, the body an inch shorter, the thigh eight-tenths of an inch shorter, while the lower leg is one and seven-tenths inches longer. The hips are only one-tenth of an inch narrower, but the shoulders are eight-tenths of an inch less in breadth.

According to the average shoulder width for the same height, in a compilation of measurements from different colleges, there is a strange and marked disagreement, while all the averages for the other parts of the body show a fair unanimity. Amherst's average shoulder width for the student seventy inches tall is seventeen and two-tenths inches, Harvard's seventeen and five-tenths inches, Yale's sixteen and seven-tenths inches, and the athlete's the same as Yale's. The extreme difference between Harvard and Yale of eight-tenths of an inch on the average, is so marked as to suggest that at Yale the measurement is taken at the point of the shoulder, and at Harvard about two inches below, thus accounting for the greater average width of the latter. This measurement of the M. A. C. athlete was taken below the acromion about two inches, and if Yale's was taken as a strictly bone measure at the acromion, then the athlete also shows narrow shoulders to a marked degree, and surely so when compared with the Harvard, Amherst and Greek standards.

Accordingly at this point I venture the assertion that the type of the runner and jumper will also denote a man with narrower shoulders than the normal, indicating an extra light bony structure throughout.

The table of Greek proportions compares at scarcely any point with the average proportions of any of the modern anthropometric tables. Either the Greek table was purely an ideal standard for over two thousand years ago, or else the modern type, as shown by the present averages, has greatly departed from the former type.

SUMMARY.

The measurements of the five runners and jumpers of the Michigan Agricultural College, who were winners of first in the Intercollegiate Contests this spring, were taken and averaged. The result was compared with the averages of thousands of other

college students, compiled at a number of large institutions, in order to discover the difference, if any, in the general build of special athletes, and to ascertain whether these differences were significant of the extra powers possessed by them. I believe that the type of the runner and jumper will be found to substantially approximate the following deviations from the modern average:

[All the following comparisons are to be understood as being with the averages for the same height as the athlete.]

1. According to these different college standards, the runner and jumper is about two inches above the average in height.
2. The athlete has a shorter body.
3. The total length of leg is longer, the lower leg being of marked extra length, while the upper leg is slightly shorter.
4. The athlete has an extra long arm stretch.
5. His hips and shoulders are narrow, the instep and ankle small, all indicating a light, bony structure.
6. The depth of chest is slightly greater, and the width slightly less, showing that his chest is not so flat as usual, but deeper in proportion to the width.
7. While the bony measure of the chest is not greater, his inflated chest is much larger, showing greater lung capacity and chest mobility.
8. The girth of hips, although smaller as to bone measure, is greater, as is also the girth of waist.
9. The girth of thigh is only slightly below, while that of the calf is considerably below the average.
10. His arms in general are somewhat smaller in girth.
11. All these variations of bodily structure, without exception, give their possessor a marked superiority in athletics over his fellow who is built in the normal proportions.
12. In view of these facts, the claim is made that special athletics should be encouraged, on the same principle that we advocate specialization in any line, because of peculiar fitness.

PHYSICAL TRAINING IN ENGLISH SCHOOLS.

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For the purposes of this article it will be found useful to discuss briefly the chief types of schools in England, and to consider games and athletics separately from gymnastics. The position of the former is different here from that in Sweden or in Germany, where one generally finds the gymnastic master or mistress regulating the games. There are, of course, some exceptions in our case, and these will be touched upon, but, broadly speaking, the gymnastic teacher fills a separate rôle and must have special treatment. It will also be necessary, to some extent, to deal with women and men teachers apart, as the development of physical training in secondary and private schools for girls has taken a somewhat different course from that found in the same type of boys' schools, where "tradition" has been a not inconsiderable factor.

It may be stated that the writer's actual experience has been chiefly in private secondary schools, but he will endeavor to mirror the lines of growth in other branches.

The schools may be roughly classed as follows:

(1) Elementary Schools.

Denominational—in both town and country.

Board—chiefly town.

Unattached—chiefly country.

Higher Grade Elementary—in the Board Schools. A kind of higher primary, doing some secondary and some technical work.

(2) Secondary Schools.

The great public, or non-local, schools—Eaton, Harrow, Winchester, etc.

Grammar Schools and Private Schools—modelled on the lines of the public schools and to some extent preparatory to them.

Secondary Day Schools—in towns.

(2a) Technical Schools—day and evening classes, usually attached to secondary day, higher grade, grammar or elementary schools, occasionally found separate.

(2b) Training Colleges—for elementary and secondary teachers.

(3) Universities.

Oxford and Cambridge—residential.

Victoria and others (Manchester, Liverpool, Leeds, etc.)—chiefly day students.

GAMES, ATHLETICS AND SWIMMING IN ELEMENTARY SCHOOLS.

In all the elementary or primary schools, especially in large towns, but so far as I am aware, in the country too, there has been very little in the shape of organized games or athletics, except in very recent times. Facilities in the shape of adequate playgrounds have been wanting, the cost of land being prohibitive. Fortunately the English child generally possesses a full measure of the play instinct, and on every open space or public recreation ground he organizes games, especially cricket and football, for himself. During the past few years most city authorities have been fairly lavish in opening parks and playgrounds, so that the shortcomings of this class of schools have been somewhat met. Within the last four or five years, however, a more definite organization of games (football and cricket), or, strictly speaking, of contests (leagues, tournaments, etc.,) has been growing up, engineered by the class teachers, certain enthusiastic ones having taken the initiative. This is as yet only in its infancy and does not now do more than touch the fringe of the school population. It seems likely to make greater strides, especially as the Government is pressing, through its codes and its inspectors, the great need for improvement in this direction. The public, and the great public schools, would also appear to be wielding an indirect influence in the matter. Undoubtedly much remains to be done in organized games for elementary schools, before their influence can be sufficiently strong. Nothing has been done for the girls, who need games equally as much as the boys.

Swimming has been taken up to a considerable extent by many Boards and individual schools, some of the former, in large cities, having appointed instructors who devote their whole time to the work. One or two School Boards have built swimming pools, but large use is made, in all cases, of the available public baths to which cheap tickets are issued for the school children. This subject again, has not touched the whole of the

school population, but I would not like to say that it has not reached a greater proportion than have games, through organized channels. Swimming arrangements are made for girls to nearly the same extent as for boys.

In the Higher Grade Schools (a sort of off-shoot from the elementary school system of which there are only about sixty or seventy in the whole country), games and swimming receive the same attention, in general, as in the elementary schools. There is nothing calling for particular mention.

SECONDARY SCHOOLS.

The games and athletics of the great public, or non-local schools, such as Eton, Harrow, Winchester, Rugby, etc., are so well known, even in America, that it would seem useless to do more than mention them. The criticism is made, both at home and abroad, that athletics form too great a part of the life of these schools. Into the merits or demerits of that question I will not enter, but will merely point out that "character"-building, as well as physical training, is sought for, the boys learning, first to be governed, then to govern, very largely through their own initiative and efforts. Any teaching, or coaching as it is called, is done more or less by example and indirect means generally.

Private Schools, owned by philanthropic or religious bodies, and by companies and individuals for private profit, are very numerous in England. Their roll of pupils may number anywhere between a dozen and a hundred or two. Athletic games, football, cricket, hockey, lacrosse, etc., are regularly practised, usually with the assistance of one or all the form (class) masters. The lines laid down are those of the great public schools referred to; in many the games are compulsory. Swimming is also nearly always undertaken if possible, not a few of these schools possessing their own pool, especially schools with more than 70 or 80 boys.

Amongst the corresponding girls' schools there is now a great tendency toward athletics, the movement growing rather rapidly. Cricket, hockey, tennis, cycling, swimming and the like have taken hold, hockey practically taking the place of the boys' football. Basket ball has made a little progress here. Swimming amongst this type of girls is not so universal as with boys, probably owing to lack of proper facilities. As there is no

"tradition" in this matter of games for girls, the rules generally recognized by men and boys have been adopted, with slight or no modifications. The old-fashioned "walk" still remains in small schools, but it is happily supplemented by the various games enumerated above.

Grammar Schools. The games are conducted on much the same lines as in private schools, though since most of the pupils are day scholars, not boarders, the organization is less complete, and in very many cases the games are not compulsory. As most of them are in cities, swimming is often a feature, since the boys can easily go to the public baths, but it is not compulsory for all pupils. The girls' grammar schools and high schools do not, as a rule, have highly organized games, owing to this same question of the pupils being there for certain hours of the day only, but, whenever possible, something is done, and in occasional schools, quite a considerable amount.

Secondary Day Schools. These are a type of "modern," rather than "classical" schools, but for our purposes they may be included with the grammar schools. They are a growing quantity, and, springing up as they do in large cities, the problem of playground accommodation becomes a pressing one. I fear that games are not by any means universal; in fact, opportunities are so few that it is nearly impossible to organize them effectively. But the danger is beginning to be seen, and I hope ere long that strenuous efforts will be made to remedy an undoubted defect.

Technical Schools. In these, which are chiefly for older students and those who attend certain classes only, there is not, as a rule, any special attention given to games. The pupils form cricket, football, or swimming clubs for themselves, and it may be that they are encouraged to do so, but that is about all.

Training Colleges for Elementary School Teachers. In some the students are encouraged to form clubs for athletics, cricket, football, or swimming, but on the whole, their time is so much occupied with lectures, studies and practicing classes, that this subject is more neglected than it deserves. I ought to say that my information with regard to these colleges is not complete.

Training Colleges for Secondary Teachers. These are so few that it is next to impossible to say what is being done. Only now are school authorities beginning to admit the necessity for technically training secondary teachers at all. Probably games

will receive attention in these institutions as they grow up, at any rate, the regular practice of them, because games have long had a recognised value in the private schools.

Universities. The games and athletics of Oxford and Cambridge need no description. They are recognized as a part, and quite an important part, of the life of these institutions. Such cannot be said, however, of the newer universities springing up in various parts of the country. Considerable endeavor is made to inculcate the corporate spirit, but with day students who hurry off home on foot or by train as soon as lectures are finished, it is a very difficult matter. Compared to the numbers attending such university colleges, the "residents" are very few indeed. There is usually an athletic ground, however, and clubs for football, cricket, swimming and other sports are in existence. Athletic contests are held annually in most cases.

TEACHING OF GAMES.

Now it will be wondered whether there is any teaching of games, and who are the teachers. It may be said that there is no formal teaching of games such as one observes given by the German Gymnastic Master or Mistress, with the exception of "coaching" by professional cricketers in the great boys' public schools, and some smaller schools of the same type, or the teaching of cycling, games and swimming by special gymnastic mistresses in some of the Girls' High Schools and Private Schools. The former can hardly be classed as pedagogic, but the latter is probably a valuable and useful work likely to bear considerable fruit, at any rate on the girls' side, and is almost certain to extend its operations. Where schools have such a mistress on the staff, it may generally be said that their organization in physical training is good, for usually it is her sole duty to keep that subject on a high level. An overwhelming portion of the teaching in games, however, is done more or less indirectly by class teachers, and by succeeding generations of boys. Most secondary and private schools teachers can play some game or other, having learnt at school or university, and their example, with an occasional hint, is regarded as sufficient. Generally, some one teacher is looked upon as games master (or mistress), and he acts as a modifying quantity on club committees and in other ways influences the boys, but it must be clearly understood that class-room methods of teaching disappear on the playing

field and he becomes for all practical purposes one of themselves, a sort of big brother, an advisor, not a pedagogue in the narrow meaning of the term. There is absolutely no training or preparation for this work; everything is left to the individuality of the teacher and to his practical knowledge. I do not think he very clearly comprehends anything of the theoretical or pedagogical side of games, except that in a general way he recognizes their effect upon character and health, but just how these results are arrived at he could not always clearly state.

Great work as it is, there is room for a considerable extension to secondary and elementary day schools, and for more pedagogical and physiological knowledge on the part of those who undertake to look after it. Not that I would, for one moment, exchange formal class-room-like teaching for the happier and more indirect methods obtaining, but the latter can be carried out by one with special knowledge, just as well as, or much better than, by one without such knowledge.

Finally, touching this branch of the subject, it may be well to refer to the volume of Special Reports on Educational Subjects—No. 2, price 6s. 2d., published on behalf of the British Education Department, by Eyre & Spottiswoode, London, Editor—Michael Sadler, Esq. Director of Enquiries. The following articles are of interest:

Physical Education at the Sheffield High School for Girls. Games, p. 142.

Games and Athletics in Secondary Schools for Girls, p. 145.

Organization of Games out of School for the Children attending Public Elementary Schools in large Industrial Centres, as voluntarily undertaken by the Teachers, p. 159.

Physical Training under the Leeds School Board. Swimming, p. 221.

THE MECHANICS OF LATERAL CURVATURE OF THE SPINE.*

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The present paper is a preliminary one, and reports a series of observations made on the normal movements of the spine in the cadaver, and the living model, studied especially with reference to the mechanism of scoliosis. The subject is so extensive and the problems involved are so intricate that it is not possible for the writer to do more at present than to call attention to certain demonstrable facts and to certain deductions to be drawn from them.

It is a well-recognized fact that in lateral curvature of the spine, at least in cases of moderate grade, the lateral bending is associated with a twisting of the vertebræ in the long axis of the spine. To the latter phenomenon the word rotation is applied by common consent.

A large amount of literature has been accumulated in the attempt to explain the mechanism of scoliosis, especially to account for the existence of the rotation, but among the theories dealing with the subject there is no one wholly satisfactory. For the most part they are very complicated; they differ widely from each other, and no one meets with general acceptance. It is perhaps hardly worth while to enumerate them, as they may be found in such books as Hoffa and Lorenz.†

These theories have for the most part been formulated either from purely theoretical considerations or by reasoning back from the pathological changes found in more or less advanced cases. As neither of these methods has so far yielded satisfactory results, it may be advisable to turn to the study of the normal movements of the spine to see if in them is to be found any explanation of the phenomena observed in scoliosis.

Bradford's experiment.—One previous attempt has been made and published in this line of investigation by Bradford,

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*Read before the American Orthopedic Association at Washington, May 1, 1900.

Hoffa: Lehrbuch der orth. Chir., 1898, p. 370; Lorenz: Path. und Ther. der Seitl. Ruckgratverkrummungen, 1886, p. 17.

who demonstrated that in the cadaver a rotary lateral curvature of the type seen in life might be produced by superincumbent weight coming obliquely upon the spinal column. This important experiment demonstrated that in the normal spine of the cadaver exist conditions capable of producing the phenomena found in scoliosis when superincumbent weight falls obliquely upon the column.* Some similar work on the cadaver was done by Dr. E. G. Brackett, but was never published.

The experiments described in the present paper were made by the writer during the past six months, in part at the Harvard Medical School by the courtesy of Prof. Thomas Dwight, to whose supervision and suggestions he is greatly indebted. The work was undertaken with a hope of contributing something to the present knowledge of the normal movements of the spine without especial reference to scoliosis, but early in the investigation certain phenomena bearing so closely on the causation of scoliosis were observed that the rest of the investigation was deferred and the time devoted wholly to the question of the causation of rotary lateral curvature. It is the hope of the writer to pursue the rest of the investigation at some future time.

Movements of spine.—The movements of the spine are generally accepted as being four in number.†

(1) Flexion (forward bending).
(2) Extension (backward bending).
(3) Lateral bending (side bending).
(4) Torsion.

Although this classification is usually found in the books, it has been often recognized that torsion is in some way associated with lateral bending. That lateral flexion probably does not exist as a pure movement has for some time been recognized by some if not all anatomists, and has been taught for some years by Professor Dwight. As long ago as 1844 Henry J. Bigelow‡ wrote: "The principle of torsion is illustrated by bending a flat blade of grass or a flat, flexible stick in the direction of its width. The centre immediately rotates upon its longi-

*Bradford and Lovett: Orthopedic Surgery, 2d Ed., 1899, p. 94.

†Poirier et Prenant: Traité d'Anat. Hum., i, 744; Gray's Anatomy; Landerer: Mechanotherapie, 1894, p. 217, etc.

‡Orthopedic Surgery. Boylston Prize Essay for 1844, Boston, 1845, p. 168.

tudinal axis to bend flatwise in the direction of its thickness. In the same way the spine, laterally flexed, turns upon its vertical axis to yield in its shortest or antero-posterior diameter." Occasional references are found to the association of torsion with lateral flexion,* but no definite recognition of the relation between the two seems to exist.

It is the purpose of this paper to show that lateral flexion and torsion of the spine are associated parts of one compound movement and that neither can exist without the other. That, however, in side bending from the flexed position the torsion is diametrically opposite from what it is in the extended position and that the spine follows the laws governing flexible rods in this regard.

(1) *Flexion* apparently exists as a pure forward movement and its amount varies greatly with the flexibility of the individual.

(2) *Extension* apparently exists as a pure backward movement and its amount varies greatly with the flexibility of the individual.

(3) *Lateral flexion* of the spine apparently does not exist as a pure movement. Something very like a pure lateral flexion is found experimentally in one position of the trunk, but owing to the complex conditions existing it is not possible to measure it with sufficient accuracy to say how pure the movement is or with how much torsion it is associated. In general, lateral flexion in any position of the trunk is associated with torsion.

The cadavers used in these experiments were six in number and had previously been used in the dissecting-room. The sternum and contents of the chest and abdomen, as well as the arms and scapulæ, had been removed, as well as the abdominal and most of the back muscles.

Experiment, cadaver: Flexion.—If the pelvis of a normal cadaver is fixed in a vice and the upright spine flexed, and by a cord attached to the atlas pulled to the left side, a very marked torsion occurs through the whole column, and each vertebra appears to change its relation to the one below it, not only in the lateral movement that it makes, but by torsion around the

*Hoffa: Lehrbuch der orth. Chir., 1898, p. 372; Henke: Handbuch der Anat. und Mech. der Gelenke, p. 66; v. Meyer: Virch. Arch., xxxv, p. 225; Tubby: Orthopedic Surgery, London, 1896, p. 143; W. A. Lane: Guy's Hospital Reports, xxix, p. 293.

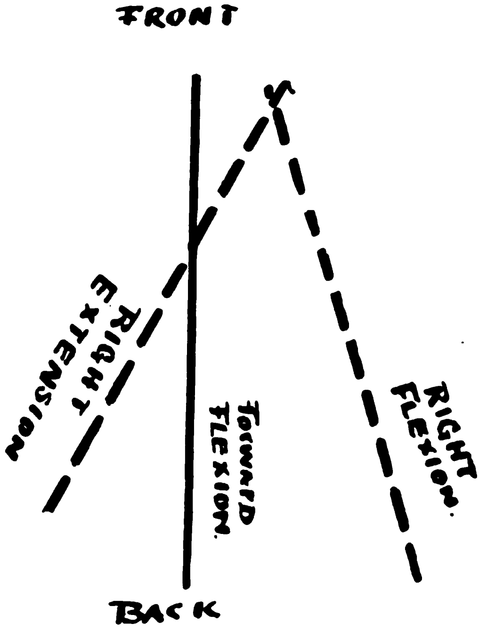

FIG. 7. Diagram.of position of brass rod in right flexion and eqtension of spine of cadaver.

FIG. 4. Spine fixed in vice, hyperextended and bent to the left. The boards mark the plane of the pelvis and chest. The pins are driven into the spinous processes. The pins have turned to the right, showing that the vertebral bodies have twisted to the left; that is, toward the concavity of the lateral curve.

FIG. 3. Model flexed and bent to the left. The cardboard indicators have turned to the left.

FIG. 1. Spine fixed in vice, fixed and bent to the left. The boards mark the plane of the pelvis and chest. The hat pins are driven into the spinous processes. The torsion of the spine is shown by both boards and pins, the bodies turning to the right.

FIG. 2. Model with spine flexed and bent to the left. The boards show the planes of chest and pelvis. The boards marking the chest has rotated backward on the convex side of the curve,

Fig. 6. Model with spine extended bending to the left. The cardboard indicators show that the spinous processes have turned to the right and the bodies to the left.

Fig. 5. Model with spine extended bending to the left. The board marking the plane of the chest has rotated backward on the left side.

Fig. 8. Spine without vertebral bodies extended and bent to the left. The rod marking the plane of the chest has rotated backward to the left. (Compare Fig. 4.)

Fig. 10. Model twisting to the left, showing the consequent lateral diviation of the spine.

FIG. 11. Model sitting on an inclined seat. The cardboard indicators show that the bodies of the vertebræ have rotated to the left; that is, toward the convexity of the lateral curve.

FIG. 9. Spine without bodies flexed and bent to the left. The rod marking the plane of the chest has rotated backward on the left. (Compare Fig. 1.)

long axis of the spine. And this torsion always occurs in one direction in flexion, the bodies of the vertebræ turning toward the convexity of the curve and the spinous process toward the concavity. Each vertebra twists upon the one below it in the long axis of the spine, the body turning in one direction and the spinous process in the other. In the cadavers experimented upon the torsion of the cervical vertebræ upon the last lumbar in side bending amounted to perhaps forty-five degrees in flexion. This torsion is slight in the lumbar region and marked in the dorsal region, especially between the fourth and twelfth dorsal vertebræ.

In the photograph (Fig. 1) thin boards are shown fastened to the chest and pelvis to mark the lateral plane of each, and hat pins were driven into the spinous processes of the first sacral, one of the lower dorsal, one of the upper dorsal, and one of the lower cervical vertebræ, to mark the anteroposterior axis of each vertebra. By having both of these modes of measurement at the same time, it may be shown that the variation of the boards corresponds to the torsion of the vertebræ—as represented by the pins driven into them.

Model: Flexion.—The same experiment was then made upon two models. Both were young women, professional models and markedly flexible; one had been upon the stage as a dancer, and the other kept herself flexible by exercises to enable her to take difficult poses without lameness. If the model bends forward and flexes her spine to the left the same phenomenon occurs that is seen in the cadaver. The spinous processes turn to the concavity of the curve; that is, to the left, which means that the vertebral bodies turn to the convexity and the right side of the chest becomes more prominent behind; that is, the rotation is backward on the convex side of the curve, as in the rotation of scoliosis. In the experiments the models were ignorant of the purpose of the experiment and were told to bend to the left without twisting.

Fig. 2 shows Model 1 with boards fastened to pelvis and chest in a similar position to that of the cadaver in Fig. 1. Fig. 3 shows Model 2 in the same position as that of the cadaver in Fig. 1 with cardboard indicators fastened over the spinous processes by sticking plaster. The rotation backward of the chest on the convexity of the curve may be seen in both Figs. 2 and 3.

In reply to a possible criticism of the experiment, that the

scapulæ, ribs and muscles cause an apparent rotation of the boards and indicators in the living model which does not exist, it may be said that the directions of the boards and indicators have been shown to correspond to each other in the cadaver, and each one of these taken separately behaves in the model as it does in the cadaver. Moreover, the rotation of the spinous processes of the vertebræ in the live model can be easily appreciated by the fingers, showing that it is a real torsion and not an apparent one.

Lateral bending, then, in both cadaver and model in positions of marked flexion is accompanied by torsion, and this torsion is in this position always in one direction, and is of the same type as the rotation seen in scoliosis; that is, backward on the convexity of the curve, or, in other language, the bodies of the vertebræ turn toward the convexity of the lateral curve. Various attempts were made to reverse this torsion while making side bendings in the flexed position by pulling the vertebræ apart, pressing them together, etc., but in all cases in both cadaver and model the type of torsion described above persisted.

Cadaver: Extension.—If the spine of a cadaver is fixed in an upright position in a vice which clamps the sacrum, and if this spine is hyperextended (bent backward) and pulled to the left in this extended position by a cord attached to the atlas, a torsion takes place, but this torsion is exactly the reverse of the one occurring in the similar pull to the left made in the flexed position. The spinous processes rotate toward the concavity of the curve and the type of the rotation is the reverse of that usually seen in scoliosis in life (Fig. 4). This torsion occurs less in the lower dorsal and lumbar region than does the one described in speaking of flexion, and is located higher in the column. The method of observation was by boards and pins, as in the flexion experiment.

Model: Extension.—If, now, a model is asked to extend her spine and then to bend to the left, it is noticed that the board marking the lateral plane of the chest turns backward on the side of the concavity of the curve, which is the reverse of the condition found in side bending in flexed positions; that is, in the model the rotation of the vertebral bodies must be toward the side of the concavity. This type of torsion is constant in all side bendings in the extended positions as observed in models and in patients.

Fig. 5 shows the Model 1 bending to the left with backward rotation of the chest on the left side.

Fig. 6 shows Model 2 bending to the left in an extended position, with cardboard indicators fastened to the skin over the sacrum, the upper lumbar, the middle dorsal, and the lower cervical region. It will be seen that the indicators show a marked rotation of the spinous processes in the dorsal region toward the convexity of the curve, and the bodies must rotate toward the concavity. Compared with Fig. 4 it will be seen that the indicators point in the same direction as in the cadaver placed in the same position, and compared with Fig. 3, a photograph of the same model bending to the left in the flexed position, it will be seen that the indicators point in the opposite direction.

In the intact spine of the cadaver, therefore, and in the model, side bending in the extended position is accompanied by torsion of the vertebral bodies toward the concavity of the curve; in other words, the rotation is backward on the concavity of the curve, which is the reverse of the condition ordinarily seen in life in scoliosis.

Experiment, cadaver: Flexion and extension.—As the complicated movements of the spine in these experiments introduced an element of mixed planes most confusing to the observer, the following experiment was undertaken by Professor Dwight and the writer at the suggestion of the former, in order to obtain a graphic record of the torsion: A spine was placed upright in a vice at the edge of a table three feet from the floor; a hole was bored through the eleventh dorsal vertebra from behind forward; that is, in the median plane of the body. Through this hole was passed a brass rod five feet in length, which projected three feet behind the spine and a short distance in front of it. This rod, of course, represented the anteroposterior axis of the vertebræ. By means of a plumb line, dropped from the rod, the direction in which this rod pointed could be projected upon the floor and its variations in the horizontal plane recorded graphically. This eliminated any element of confusion on the part of the observer by giving a permanent and accurate record. The spine was then flexed, and before being bent to either side, the direction of the indicator was projected. The spine was then bent sideways to the right and to the left in the flexed position and the direction of the indicator recorded in those positions. It was then ex-

tended and bent to the right and left in the extended position and a diagram was obtained (Fig. 7). The crossing of the two lines to the right of the median plane, one for right flexion and one for right extension, shows plainly enough that there exists one type of torsion for side bending in flexion and another for bending to the same side in extension.

Pure lateral flexion.—If one type of torsion changes to the other type in going from flexion to extension, there must be a position between marked flexion and marked extension where the planes cross, and in this position, if anywhere, the purest lateral flexion must exist. By experiment in both cadaver and model this plane was found to be in slight flexion of the spine in the upright position, perhaps fifteen degrees in front of perpendicular. In the sitting position in the model, this plane exists in a slightly more extended position than when standing upright. In the upright position of the soldier, side bending is accompanied by the extension type of torsion.

Reasons for torsion.—It is obvious from these experiments that there must be some fundamental reason for the constant occurrence of one type of torsion for side bendings in flexion and the occurrence of another type in extension, as well as for the constant association of torsion with side bending. The vertebral column is a flexible rod capable of bearing great weight. It is not equally flexible in all directions, but it is of course capable of some movement in all planes, and as such, should come under the control of the laws governing flexible rods in general. The extent of any of the movements of the spine is, of course, greatly influenced by the shape of the vertebral bodies, the curves of the spine, the character of the articular processes, the resistance of the ligaments and the relative strength of the muscles. But in spite of these complicating elements, it seemed worth while to investigate the behavior of flexible rods in general under similar conditions. Professor Dwight suggested that this line of investigation might be of use.

To Professor Hollis, of Harvard University, the writer is indebted for much information on the mechanical side of the question.

From the mechanical point of view, torsion results from any motion in which all the particles of a straight flexible rod do not move in parallel planes. Consequently, if such rod is bent in two planes at the same time, torsion must inevitably occur. The

vertebral column is not a straight flexible rod, but one bent in the anteroposterior plane by a series of gentle curves; side bending must therefore inevitably lead to torsion, because it means bending in two planes. Nor does the fact that the intervertebral discs permit motion in all directions affect the question, because from a mechanical point of view the vertebral column behaves in general as it would if it were a homogeneous flexible rod, and one does not have to wait for torsion to occur until the intervertebral discs are compressed and the edges of the vertebræ come into contact, for, from a mechanical point of view, the torsion begins with the beginning of the side bending. It therefore seems very unlikely that pure lateral flexion of the spine ever exists.

A strip of sponge rubber, half an inch in diameter and fourteen inches long, rotates in the same way that the vertebral column does in the same position. It rotates in one direction for side bending when bent forward and in the opposite direction for side bending when bent backward, and the rotation follows the same rule observed in the vertebral column in the cadaver and in life. A lateral curvature, in what corresponds to the flexed position of the spine, may be produced in the rubber strip following the same rule of rotation seen in life; that is, the front of the rod turns towards the convexity of the lateral curve. An artificial lateral curvature in the rubber strip, made in what corresponds to the extended position of the spine, results in a reverse rotation to that from the rotation of the flexed position. A piece of rattan, a gum-elastic catheter, a piece of rubber tubing, or a strip of sponge rubber, round or square, behave all in the same way, and rotate in the same direction as does the spine when placed in a similar position to those described in the experiments on the model and cadaver except that they allow pure side bending in the lateral plane.

For side bendings, when bent forward, the flexible rod rotates one way, and when bent back and to the same side it rotates the other way. So far as this analogy goes, the spine, therefore, in its rotations does no more than to follow certain laws governing flexible rods, and the elaborate theories to account for the occurrence of rotation in scoliosis may be replaced by the statement that the spine behaves in general as any flexible rod would under similar condition so far as rotation is concerned.

Articular processes.—Although it is easy to understand that the column of vertebral bodies by itself might easily behave as

a flexible rod, yet the articular processes cannot be left out of account. They must be an important factor in determining torsion, and they must do one of two things. Either they must fall in with the behavior of the flexible column of bodies and serve to carry out the rotation which would occur without them, or they must obstruct or reverse the rotation which would occur in the column of vertebral bodies alone.

Experiments, cadaver: Spine without vertebral bodies.—The experiments to be given seem to show that when the articular processes are in contact they merely serve to accentuate the same rotation that would be present if the column of vertebral bodies were by itself.

Two vertebral columns, which had been previously used and which had conformed to the usual rule, were prepared for experiment by removing the column of bodies by cutting through the pedicles. The columns experimented upon then consisted of laminæ and articular processes with their ligaments. The ribs were not removed from these columns. These could no longer be regarded as flexible rods, and were only anatomical preparations to demonstrate just what part in rotation the articular processes would play if left to themselves.

Each of these spines was then placed in a vice as in the experiments described above and pulled to the side in the same way. When the spine was extended and pulled to the left rotation occurred of the same type as in the intact column in the similar position, a rotation of the ribs backward on the side of the concavity. That is, the articular processes alone do the same thing in side bending in the extended position that the intact column does (Fig. 8).

In side bending from the flexed position, however (Fig. 9), the spine without bodies rotates in just the reverse direction from that of the intact spine in the same position, the rotation of the ribs being backward on the side of the concavity. This, of course, suggests that in side bending in the extended position the articular processes are active, but that in flexed positions they are not.

To see if this state of affairs really existed, a spine which had been used and which had followed the rule was sawed longitudinally in such a way as to divide each articular process in the long axis of the spine. The portion on the outer side of this cleft was removed, giving a view of each articulation. The

spine was then flexed, and it was found that as moderate flexion began the articular joint surfaces in the dorsal region, which was the particular field observed, began to separate, and in extreme flexion were separated by an interval of perhaps one thirty-second of an inch. As the spine was extended they seemed to come into close contact at about the point where the flexion rotation changes to the extension rotation. In marked extension they were firmly in contact.

The conclusion from this is that the column of vertebral bodies alone, without articular processes, would rotate in just the same way in side bending in flexion and extension that the column does with articular processes present. That in flexion they are not sufficiently in contact to determine the rotation, but that in extension they are in contact, and are the active factors in determining the rotation which occurs in extension. That rotation is, however, in the same direction that it would be if the column consisted of vertebral bodies alone. They apparently serve to accentuate and carry out the behavior of a flexible rod in general, although they undoubtedly aid in preventing pure lateral flexion of the spine.

Leaving for a moment out of consideration the behavior of the column without vertebral bodies, and confining ourselves to the intact column in the cadaver and the model, it is shown by the experiments that there is one torsion for side bending in flexion and a diametrically opposite one for side bending in extension, and that the type of torsion seen in scoliosis in life is the one occurring in side bendings in flexion where, in orthopedic terms, the rotation is backward on the side of the convexity of the curve.

(4) *Rotation.*—The fourth motion of the spine mentioned at the beginning of the paper must now receive attention. If lateral flexion is associated always with rotation, if the two are component parts of one composite movement, one would expect as a corollary to what has gone before that rotation could not exist without causing lateral flexion.

An experiment was made on the cadaver, which was fixed as described above and the atlas sharply rotated to one side. A well-marked lateral deviation of the spine took place.

Model No. 1, seated on a stool, was told to twist to one side but not to bend laterally in so doing; Fig. 10 shows that a well-marked lateral deviation of the spine occurred in this experiment. A similar photograph was taken of model No. 2, showing

exactly the same condition. It therefore seems as if torsion of the trunk could not occur without lateral deviation.

Accepting the fact that in the spine lateral flexion cannot exist without torsion, it is plain why rotation should accompany any degree of lateral deviation of the spine; they are two parts of one movement and neither can exist alone.

Causes of lateral deviation of the spine in life.—To account for the phenomena found in rotary lateral curvature one has then only to formulate the factors which will cause the spine to be held to one side of the perpendicular; compensatory lateral deviation must occur and with it rotation. Such causes are manifold and well recognized, for asymmetry is the rule rather than the exception. Neither the head nor the pelvis can vary from their normal relation without producing some degree of compensatory lateral deviation somewhere in the spine.

Asymmetry of the head is a factor not often taken into account. Asymmetrical position of the head is favored by the fact that in most cases the condyles of the occiput are not in their best contact with the superior articular surfaces on the atlas when the head is held straight; a closer and better contact is generally obtained by a slight twisting of the head. This fact was pointed out to the writer by Professor Dwight. Ocular defects causing improper balance of the head are an obvious cause. One has only to observe the faulty carriage of the head in many cases of scoliosis to see that here is a condition of importance and often too marked a condition to be accounted a result of the scoliosis. Asymmetry of the pelvis as described by Barwell must be accounted as a not infrequent cause of asymmetrical positions. Asymmetry of the spine itself and unequal thickness of the vertebral bodies on the right side as contrasted with the left must be remembered as a demonstrated condition.* Shortening of one leg is so common that it fails to attract the attention that it deserves.†

All these defects of conformation must lead to some lateral deviation of the spine. It depends upon the individual whether

*Herth: Zeitsch. f. orth. Chir., 1892, i p. 246; Schulthess: Zeitsch. f. orth. Chir., 1899, vi, p. 1.

†Hunt: American Journal Medical Sciences, January, 1879; Philadelphia Medical Times, August 3, 1878; T. Dwight: Journal of Anatomy and Physiology, xiii, 1879, p. 502; Morton: Philadelphia Medical Times, July 10, 1886; Bradford and Lovett: Orthopedic Surgery, 1899, 2d Ed., p. 595.

these are taken care of by nature in some compensatory way, or whether they cause a deviation notable enough to be classed as a deformity.

Aside from the structural defects causing asymmetry and consequent lateral deviation, are to be found the vicious postures resulting from attitude and occupation, which must be accounted another important factor in producing scoliosis.

Type of rotation in scoliosis.—In flexion it may be repeated that side bending of any part of the spine must be accompanied by rotation of the vertebral bodies toward the convexity of the curve. Inasmuch as the great majority of cases of scoliosis show this type of rotation, it is evident that such scoliosis must have had its beginning during flexed positions of the spine. It is a well-known fact that many cases of scoliosis are produced by round shoulders, and the muscular development of patients with scoliosis is as a rule below the average. Poor muscular development of course predisposes to a flexed position of the trunk.

It seems likely that the beginning of scoliosis is much more often acquired by children in the sitting than in the standing position, because the sitting position makes flexion of the spine more easy than does the standing position.

An experimental scoliosis with rotation is shown in Fig. 11, in which the Model 2 was asked to sit squarely, but at ease, on an inclined seat. The indicators on the skin over the spinous processes show that the bodies of the vertebræ have rotated toward the convexity of the lateral curve.

Reverse rotation.—The "reverse rotation," where the rotation of the vertebral bodies is backward on the side of the concavity of the curve, has been described as occurring in life, and has been somewhat discussed.* Although the writer is not yet prepared to accept the fact that this apparent type of rotation is anything more than a slight lateral deviation with excessive rotation, yet the experiments above related show how the so-called "reverse curve" in scoliosis might occur from an anatomical point of view. If a column is curved laterally in the extended position this type of rotation must be found. One has only to examine a dried vertebral column to see that lateral motion between the dorsal vertebræ when their articular processes are in contact must result

*Jach: Zeitsch. f. orth. Chir., 1892, i, p. 252; Steiner and Schulthess: Zeitsch. f. orth. Chir., 1896, v; Kirmisson and Sainton: Revue d'Orthopedie, 1885, iii; Vulpius: Zeitsch. f. orth. Chir., 1896, iv, p. 63.

in the rotation of the bodies toward the concavity of the lateral curve. Moreover, such a type of rotation is an intrinsic property of any flexible column bent to the side in the extended position.

School furniture.—In the prophylaxis of scoliosis, from this point of view, correct school furniture seems to be of the greatest importance. Sitting to one side in the flexed position is to be avoided on anatomical grounds, and it is interesting to note that the weight of opinion has inclined to the style of chair and desk in which the edge of the desk overhangs the edge of the chair, the so-called "minus distance." It is easy to see that an arrangement of school furniture which allows a growing child to sit for hours with a flexed position of the spine, with muscles tired and stretched, is one which predisposes to a deformity which is associated with the flexed position. Inasmuch as we have seen that torsion causes of itself lateral deviation of the spine, the twisted position that children assume in writing, especially in connection with flexion, must of itself be accounted a direct cause of scoliosis, inasmuch as it causes lateral deviation of the spine. It has been demonstrated* that children who sit squarely at their writing, and who learn the upright style of writing, show a smaller percentage of scoliosis than children who learn the slanting hand, a fact easily explained from this point of view.

Treatment.—Of course, theoretical conditions such as those given above are of value only in so far as they may influence prophylaxis and treatment. Scoliosis on this supposition may be assumed to be a deformity arising from superincumbent weight, coming obliquely upon a spinal column in the flexed position. The correction, so far as possible, of asymmetrical attitudes and the prevention of undue flexion of the spine would seem to constitute the prophylaxis.

In the treatment of the condition when it exists, on this supposition, much emphasis must be laid on the detection and correction where practicable of the causes of asymmetrical attitudes. It is not always possible to do this. A short leg can be compensated for by a thicker sole, but an asymmetrical pelvis cannot be rectified.

The second and more important deduction to be made from the experiments is the importance of securing and maintaining the spine in a position of extension at the seat of the deformity. If

*Burchard: Zeitsch. f. orth. Chir., 1892, ii. p. 1; Kotelmann: School Hygiene, p. 315.

the rotation of the extended position is the reverse of that of the flexed position, the use of extension as a means of treatment deserves a much more important place than it has received.

It is easy to see from this point of view why symmetrical gymnastics, cultivating the extensor muscles, such as those described by Teschner,* are of so much value; and it also explains what many of us have found out empirically, that it is desirable to hold and exercise the spine in positions of extension.

The problem seems to be, from an anatomical point of view, to bring the articular processes into firm contact, and to get their influence in counteracting the rotation acquired during flexion, as well as to call upon the intrinsic property of the spine as a flexible rod to reverse in extended positions the rotation acquired in the flexed positions. In a case of dorsal lateral curvature it is not enough to give backward flexions which shall take place chiefly in the lumbar region; such backward flexions must be made so far as possible to take effect in the region where the lateral deviation exists. It is the extended position of the deviated region that one wishes to bring about.

Given a fairly movable spine with a primary curve to the right in the dorsal region, and a rotation backward on the right side of the curve, the correction of such rotation must be most easily made by exercises given to induce extension of the dorsal part of the spine where the deviation exists. By calling upon the intrinsic property of the spine to reverse in extended positions the rotation acquired in flexed positions, it would seem that we were pursuing the most rational course. It would seem also that forcible correction should also be made in the position of extension of the spine and that a forward thrust at the seat of the lateral deviation should diminish the rotation.

When, however, it comes to the question of fixed curves and deformed vertebræ, the question is one of such complexity and difficulty that it is impossible from these experiments to speak at present as definitely as one can in cases more nearly normal.

The use of symmetrical extension exercises and of side bendings in the extended position is, therefore, from an anatomical point of view, most important.

Gymnastics.—It must be evident from what has been said that simple gymnastic exercises are safer than complicated ones.

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*Teschner: Transactions American Orthopedic Association, vol. ix, p. 10.

Many persons prescribe exercises of such complexity and intricacy that no one can possibly judge just what he is doing. If side bendings inevitably cause torsion and torsion lateral deviation, they are dangerous gymnastic elements to introduce into a problem already difficult enough. Safety lies in prescribing only exercises of which one can estimate the anatomical effect.

The writer is fully aware that this paper leaves out of consideration the subdivision of lateral curvature into the varieties according to their etiological types as well as the various types of curves. Given, as we have in the spine, the mechanism ready to produce a scoliosis and a superincumbent weight coming obliquely upon the column from some of the causes mentioned above, the column will yield where it is weakest; it may be in the lumbar region or in the dorsal. Compensatory curves will occur, bony deformity will result if the condition continues, and the complicated structure of the parts involved will allow of almost infinite variety in the location and the character of the curve. The ribs, of course, follow the rotation of the vertebræ to which they are attached. The writer has endeavered to deal only with the broader aspects of the question and to avoid generalizations from clinical experience.

SUMMARY.

This paper may be summed up in a few words, as follows:

Torsion and side flexion of the spine are parts of one compound movement and neither exists to any extent alone. Lateral deviation of any part of the spinal column is therefore necessarily associated with torsion (rotation) at the seat of the deviation.

In flexed positions bending is associated with torsion in one direction, in extended positions by torsion in the opposite direction. In this it follows simply the mechanical law governing flexible rods, which rotate in general in the same way in corresponding positions. From the kind of torsion observed in scoliosis it is obvious that the deformity originates in the flexed position of the spine. The correction of the rotation would therefore seem to be logically made by throwing the spine into extended positions and in taking side bendings from extended positions.

Sitting in the flexed position by school children is likely to be harmful, and sitting in a twisted position of necessity induces

lateral deviation temporarily. The immediate cause of lateral deviation is, as a rule, to be found in some asymmetry of development or posture which leads to an oblique direction of superincumbent weight, causing the spine to deviate from the middle line.

REPORT OF THE COUNCIL.

National Council: Meeting, June 1st.

Present: Drs. Sargent, Hitchcock, Fitz and Mulliner, Mr. Eberhard, Miss Narey and Baroness Posse.

The Recording Secretary read the minutes of the previous meeting.

The Treasurer reported balance on hand as per report of May 11th, $83.82; received during interval, $87.13; paid during interval, $18.43; balance on hand, June 1st, $152.52.

The Corresponding Secretary reported receipts for May, $55.25; expenses, $13.52.

Voted, that the President and Secretary be empowered to elect members during the summer.

Dr. Fitz read an outline of the work thus far accomplished by the Committee of Nine.

Adjourned until October.

Baroness Rose Posse,
Recording Secretary.

NEW MEMBERS.

According to the vote of the Council, Mr. F. P. Valdés, Charleston, S. C., was elected to membership, July, 1900.

CORRESPONDENCE.

INTERNATIONAL CONGRESS OF PHYSICAL EDUCATION.

GENEVA, SWITZERLAND, September 16, 1900.

Editor of the American Physical Education Review:

The International Congress of Physical Education was disappointing in many ways. It had not been well organized in practical details, although the general classification of subjects in the first circular of information seemed to me to be very good. The meetings were not well announced and there was no definite daily programme. The majority of those in attendance were of course French, although the different countries were fairly well represented. Germany, however, had no delegates and the English representative was a music teacher with a gymnastic fad. Mme. Osterberg took no part in the Congress apart from her exhibition of gymnastics, which was very creditable. M. Demeny, the General Secretary, was the backbone of the Congress, but he had been badly overworked and could not control the practical details. As there were no precedents for such a congress much time was wasted in discussing the appropriate way to conduct its meetings.

The papers of the section of Philosophy were first read and resulted in long, wordy and heated discussions which sometimes became personal. The first day's proceedings proved that the programme was being carried out too slowly and it was accordingly announced that abstracts only could be read before the Congress. In the subsequent discussions, however, questions were frequently asked which compelled the speaker to go back and read most or all of his paper. If the paper proved too long or uninteresting, the audience would demand that he stop, and he was forced to yield to their request if it was so voted. One or two speakers were stopped in this rather uncomfortable manner. A very simple remedy for this would have been to limit in the beginning the time for the paper and for the discussion. The papers or abstracts were all read in French, with the exception of Miss King's of Boston. She read in English, in a pleasing, ani-

mated and effective manner, which held the attention of the audience very well, although very few understood what she was saying. The papers as a rule were not read well.

At the organization of the Congress on August 30th, the address of the President, M. Léon Bourgeois, was read, as owing to illness he was unable to appear at this, or indeed any meeting. Professor Angelo Mosso presided as chairman for a part of the first meeting.

At the meeting on Friday, August 31st, the following proposition was approved by vote of the Congress:

"(a) There should be one fundamental, international basis for physical education, with national application adapted to local conditions.

"(b) Scientific principles are necessary for application to practical education.

"(c) Gymnastics must conform to the laws of physiology, psychology, physics and chemistry."

Professor Mosso delivered an address upon "Physical Education in the United States" at this meeting. He spoke in praise of American methods and conditions. He emphasized the influence of physical education upon university life in the United States, spoke of the participation of college professors in physical exercise and of their sympathy with all forms of exercise, and contrasted the lack of such interest on the part of similar professors in France. He referred to the large number of teachers of gymnastics in the United States, deplored the effect of political influence in France and the absence of scientific gymnastics. He said gymnastics must be attractive. The French treatment is too artificial, and games are unfortunately absent. In contrast, he referred to the prominent position occupied by football and various games in the United States and in other countries. He called attention to the fact that all races except the Latin have gymnastics and athletics, and that a race, to develop, must have out-door sports.

In the discussion of Mosso's paper it was stated that schoolmasters were the natural enemies of the scientist.

Other papers under Philosophy were read at this meeting. The treatment in all of them was somewhat too general. Dr. Seuvre spoke of the importance of physical education as a factor in the treatment of backward and deficient children, and of their enjoyment of exercises and games.

On Saturday and Monday the presiding officer was A. Fosse-

prez, Inspector of Physical Education in Belgium, and one of the most level-headed men of the Congress.

The papers on Pedagogy were chosen by vote of the Congress.

M. Cuperus, President of the Gymnastic Societies of Belgium, presented a paper, and Dr. Yamane gave a printed report of "Physical Education in Japan."

M. Jean Chryssoffis of Greece created a good impression at the Congress as a quiet and careful student. In his paper he emphasized the advantage of a mixed system of gymnastics, including games, referring to the Greek games by way of illustration.

Miss King's paper read on Tuesday morning was the only paper upon Technique read during the Congress.

On Wednesday, papers in Section II. were taken up. Dr. DeMoor's paper was one of the most thoughtful and valuable papers read before the Congress. Dr. DeMoor emphasized the importance of movement and exercise from the standpoint of psychological effect. He discussed in detail the effects of exercise upon motor nerves, upon cerebral centers, upon the psychic qualities, and particularly upon the development of will power. The paper was clear, logical and effective, and altogether favorable to physical education when scientifically and rationally carried on.

Dr. Godin's paper dealt with the effects of posture and exercise upon the position of the viscera, but it did not impress the audience very much.

M. G. Demeny read a very practical paper on the effects of various exercises upon the expansion of the thorax. He pointed out that gymnastics were necessary to man in erect posture and emphasized the importance of developing the muscles of the back.

Dr. MacKenzie's paper on the effects of strain, breathlessness and fatigue upon the facial lineaments, or expression, showed more careful, special preparation than any other paper of the Congress, but it was too technical and advanced for the Congress in general. An abstract of it was given in French, and the photographs of Dr. MacKenzie's original casts were passed about and aroused considerable interest.

The excursions were carried out in accordance with the programme.

The Gymnastic Fête at Vincennes on September 2d, in which over five hundred school boys of different ages took part in a great variety of open-air exercises, was very interesting. The

mass formations and drills were executed with great precision, after the military style, of course. There was squad work on horizontal and parallel bars and flying rings and some work on peak padders. The pyramid formations were very fine. Some free arm work with a good deal of arm thrusting, charging and balancing on one foot, with body twisting, was also given. A squad of soldiers executed a gun and bayonet drill in fine shape, and a group of soldiers did some fencing and broad sword work. The smaller boys in the meantime had played two or three different games with balls and rope jumping. The bar and ring work was done quite after the German style. The free arm work with the vigorous thrusting and difficult balancing was a little different from anything which I had seen before.

On Monday afternoon, September 3d, there was an exhibition by thirteen students of Madame Osterberg in the Y. M. C. A. Gymnasium. The women, who were English, were finely developed and trained, and the work was splendidly done. The programme included the Swedish free arm movements, exercises upon the stall bars, stools and Swedish bom, marching, fancy steps, dancing and basket ball. While I did not approve of all the movements from a physiological standpoint, still the women were fine exponents of the system, and I have never seen work on the whole better done.

After this exhibition we were driven to a new shower-bath establishment (Bains Douches), which was interesting because of the comparative novelty of this form of bath in Paris and France. This establishment is not a commercial, but a philanthropic enterprise. The shower-bath, with hot and cold water, is furnished for 20 centimes (four cents), and each individual is allowed fifteen minutes to bathe. The baths were well constructed with marble and tiles.

At eight o'clock, Monday evening, Capt. Lefèvre of the Belgium Army, who has studied at Stockholm, gave a lecture on Swedish gymnastics, illustrated by stereopticon views from photographs of the Royal Central Gymnastic Institute at Stockholm. The lecture was very interesting and the views good.

During August there was a series of lectures given by an Inspector of the New York schools, with very good biograph illustrations.

On Wednesday, September 5th, there was a reception for members of the Congress in the magnificent Paris City Hall.

On Thursday morning the members visited the Military Gym-

nastic School at Joinville, just out of Paris. The buildings were first inspected and then the soldiers there gave an exhibition of their training in gymnastics, free arm and apparatus work, setting-up exercises, gun drill, fencing and sword exercises, and in the drills devised to train them for service on the field and for the various emergencies of war. The latter included scaling walls and ramparts, crossing ditches and other exercises of a similar nature.

On Thursday afternoon the closing session of the Congress was held. A city official presided and made some formal remarks on behalf of the Government. At this session it was voted that one delegate from each country should be chosen by the Congress to form a body which should constitute the International Commission of Physical Education; that each delegate should organize a committee in his own country, and it was the sentiment of the Congress that each national committee should prepare a report on the status of physical education in his own country for the International Congress. The delegates were elected by the entire Congress and those delegates present were chosen for the Commission. After this the Congress was formally adjourned. The Commission, so far as I can ascertain, is made up as follows:

France, Demeny; Belgium, Fosseprez; Austria, Lucas; Spain, Fatigatio; Sweden, Törngren; England, McDonald Smith; United States, Wood; Italy, Mosso; Hungary, Kovacs; Switzerland, Gentil; Norway, Peterson; Greece, Chryssoffis; Germany, Gebhardt; Denmark, Kier; Japan, Yamane; Roumania, (?); Mexico, (?).

It was tentatively proposed that the next International Congress should be held in Geneva, Switzerland, in August, 1902. The formal consent or invitation of the Government was thought necessary to choice of place of meeting.

Immediately after the Congress adjourned the members of the Commission met and took the following steps:—Professor Angelo Mosso was elected President and two Secretaries were chosen, M. Fosseprez of Brussels, and M. Demeny of Paris. M. Fosseprez is a business man and will attend to the business correspondence, and M. Demeny will be the technical and advisory secretary. Demeny proposed the idea of an International Review, and the American Physical Education Review was suggested for this purpose. It was the feeling of the Commission, however, that America was too far away, and that they must have their journals in Europe. In fact it was urged that each delegate should work

for a National Journal of Physical Education in his own country. For the present, however, it was suggested that individuals should send papers to the American Physical Education Review.

It was further proposed that each delegate should ask his Government for a sum of from 200 to 500 francs, to cover the expense of circulars, the work of the Commission, the possible starting of a Journal and propaganda in general. It was voted that the Commission should be called "The (Permanent) International Commission of Physical Education," and that the Committee should be termed "The National Section of the International Commission." The National Committee may be of any size, but it was suggested that each country should have one vote at the International meetings. It was also suggested that the National Commission should be representative of the various forms of gymnastic interest and effort in each country.

I do not know what will come of all this, but the meeting of the Commission was the most promising feature of the whole Congress, and I hope that the cause and science of education may be the gainer in the end. I believe that any effective work in America will come through the A. A. A. P. E. I will try to get a complete list of the members of the International Commission as soon as possible.

Sincerely,

T. D. Wood,

(Leland Stanford University, California.)

I find among my notes some on the introductory address of the Vice-President at the opening session, as follows:—

"This movement is supported by illustrious personages.

"The causes of degeneration multiply.

"Nature will not allow us to live artificial lives. We must act and struggle in order to live. We must have faith in our work, agree on principles, and lay out plans to be followed.

"Bad exercise is often worse than none.

"We must fight against the dwarfing influences of various schools and concentrate our efforts.

"Athleticism is often excessive, but is the parent of physical education.

"Force without ideas is like muscle without brains.

"The military is the first mode of applying force acquired by physical exercise.

"Exercise must be well proportioned and balanced and must be varied.

"It is not alone development of muscle but of the skeleton and of the organs, and the physical must have good reaction upon the moral." (He referred also to the benefits of manual training, music and dancing, and bespoke the coöperation of women.)

THE INFLUENCE OF EXERCISE ON GROWTH.

The Editor of the American Physical Education Review:

Dear Sir: Until I received your letter, of the 9th of July, in which you called my attention to an article by Dr. Arnold, criticizing my work on the "Influence of Exercise on Growth," I had no knowledge whatever of the existence of the paper. The article appeared at a time when I was cruising and, consequently, escaped my attention. Although about two years and a half have elapsed since the article of Dr. Arnold was published in the Review, I hope it may not be too late to ask you to publish a few words in the form of a reply.

The somewhat misleading criticism, although aimed at me, misses its aim and hits the method, the imperfections of which we all know. Since, however, it is the only method available up to the present time, we can scarcely be blamed for having no choice in the matter. There is no doubt whatever that the results which we will some day obtain by means of the individualizing method will be more accurate and nearer the actual facts than those which we have so far reached with the aid of the generalizing method.

So far as my conclusions are concerned, I fail to see where Dr. Arnold's remarks either add to or detract from them in the slightest degree. By a process of reasoning quite his own, and with the aid of an arithmetical error, likewise original, he arrives at the conclusion that "The growth under exercise for the first year would, therefore, be 34 mm. (instead of 38) under the most favorable conditions." I fail to understand it so. In the first place, Dr. Arnold divides the year into a first and second half, and, as if all the boys aged between 16 and 17 years, for instance, had been exactly 16 years old when the exercises began and exactly 16 years and 6 months, when it had to be given up; while the fact is that every day of human life included between the 16th and the 21st year has been under the influence of the exercise and, consequently, the numerical values of the increases in development are averages. These cannot, therefore, be divided into unequal

halves unless whatever is subtracted from the second half is added to the first half, so that their sum shall be equal to the average number. Since, in the second place, the various increases, occurring under exercise between the different years, as given in my tables, are likewise averages, it ought to be perfectly clear that, had the exercises been continued twice as long, twelve months instead of six months, under the same conditions, these increases would have been twice as large. I have chosen to multiply the semi-annual values obtained under the exercise rather than to divide the annual normal growth values by two, in order to make the comparison more homogeneous, but both methods would prove the same thing, quantitatively as well as qualitatively.

As regards the stimulus of exercise, it is a well-known physiological fact that our neuro-muscular mechanism reacts with increasing promptness and strength while undergoing a process of physiological training, as time-reaction experiments have abundantly demonstrated. When, therefore, the exercise is done under these conditions, there is no such thing as the stimulus of exercise ever dying out in the living human subject. A fatigued and overworked muscle is no longer a normal muscle.

Nor does the increase in weight and strength, as given in my tables, show anything that might be too much to expect; we only need to look at our strong men and pugilists, who keep their training up for years, to find what enormous weights and what an amount of strength may be accumulated by years of training. I do not say that these results are desirable, but that we may expect them to occur, under the conditions given in my paper, I confidently believe to be true.

My remarks on the "vital index" remain as true as they were before Dr. Arnold's discoveries. "Wrong" and "preposterous" are adjectives that avail us nothing against results that stand on experimental grounds; only results derived similarly or according to better methods, are here entitled to consideration.

It, therefore, ill becomes Dr. Arnold to suggest what is needed to "settle this question," more especially when that is the very thing that he should have done, before he undertook to criticise the work of others.

HENRY G. BEYER.

September, 1900.

EDITORIAL NOTE AND COMMENT.

All changes of address of members of the A. A. A. P. E. should be immediately reported to the Corresponding Secretary in order that the list may be corrected.

Those who have not yet paid their dues are hereby reminded that the year is drawing to a close and that the existence and success of the REVIEW depend upon the prompt payment of dues.

This number of the REVIEW has been delayed in order to include Dr. Wood's interesting letter describing the Congress of Physical Education at Paris. Later we hope to give some of the papers in full or abstract, read before the Congress.

The correspondence between ample physical endowment and a good working brain has been successively investigated by Dr. W. T. Porter, Professor W. W. Hastings and Dr. H. G. Beyer. The essential point thus far reached is as follows: In general, the boy who has a well developed and well nourished body takes higher rank in his mental work in school than the boy who is less favored physically. This proposition when stated by Dr. Porter was attacked by Professor Franz Boas on the basis of studies in Worcester and Toronto, which failed to show any such superiority of the larger boy. Dr. Boas argued that the method of calculation was responsible for the result in Porter's investigations. The corroboration of Porter's results by Hastings and Beyer based on studies in Nebraska and Massachusetts respectively, may be taken as establishing the truth of his conclusions, in spite of Dr. Boas' criticism, since the methods employed can hardly be supposed to be subject to such constant and consistent error as would be necessary to produce the concordant results reached by the three investigations.

This fact, if we may consider that it is now fully established, is of the greatest interest since it opens up an immense field of positive pedagogical therapy. It has been demonstrated over and over again that physical exercise increases the height and weight of children. We have now the demonstration that children of the

same age are able to do school work in direct ratio to their physical development, that is, to their height and weight. We have, then, the whole question reduced to a logical demonstration. If the child is under-developed and is backward in his studies, physical exercise is what he primarily needs to bring about the development which will enable him to pursue his studies with greater efficiency.

This statement, however, does not explain the essential mechanism of improvement. The individual who is under-sized is thought to do poorer work because his nutritive processes and general cellular activity are below normal, thus reducing the functionating power of the brain cells. The physical exercise which gives an impetus to the development of the tissue cells, may also be considered to improve the nutrition of the brain cells so that they become functionally more efficient. The mechanism by which this is brought about is still too obscure for formulation. It is not at all impossible that the beneficial influence of the exercise may arise through chemical products resulting from the activity of the muscle or nerve cells, either directly or indirectly.

In these days of the realization of the physiological importance of the internal secretion of glands and organs, as of the kidney, liver, thyroid, etc., can we not consider the possibility of the secretion, or excretion, of muscles or motor nerve cells (or both) necessary for the proper stimulation of the general organism and formed in proportion to the amount of exercise given the individual? The fact that the extract from a fatigued muscle has been demonstrated to lessen the strength and activity when injected into a normal animal, does not vitiate the hypothesis, since in the studies of the various toxins, it has been found that small doses are without harmful effect, and actually do develop in the body a power of resistance to the poisonous action of the substance, whereas large doses are immediately toxic. Reduced to its simplest terms this proposition would involve the production of a substance either as a true secretion or as merely an excretion which, when thrown into the blood by the active muscles (or nerve cells) and carried to the other tissues, would have the power to stimulate the cells of these tissues (in the course of time after the immediate fatigue effects have passed off) to greater working efficiency, to growth, or to both efficiency and growth.

Given a certain amount of general exercise, we should then have an equivalent amount of health and strength: given more

exercise, we should have an increased amount of health and strength up to the optimum. Beyond that, of course, we should have the ordinary limitations found for all good things of which we may have too much.

This would make the fundamental question of exercise for health's sake one of dosage, and we could then, except in cases of deformity, bad posture and clumsiness, ignore the complications now introduced by the various systems and consider exercise from the standpoint of foot-pounds of effort on the part of the individual. The value of a demonstration of this hypothesis would lie in the simplicity with which physicians and teachers could prescribe for both the under-development and the stupidity of their patients and pupils!

NEWS NOTES.

Mr. John Koren found in his studies upon the Economic Aspects of the Liquor Problem, for the Committee of Fifty, that in a general way the poverty which comes to the notice of charity organization societies can be traced to liquor in about 25 per cent of all cases, while in the cases in almshouses the percentage rises to 37 per cent. The results obtained by Mr. Charles Booth in his investigation in East London indicated that liquor was the cause of poverty in not more than 15 per cent of the large number of cases studied.

In several primary schools of Paris, Colonel Dérué, inspector-general of physical education, has been carrying on experiments to determine the value of physical training in the development of children with marked physical defects. The children were all weak, anæmic, poorly developed, with consumptive tendencies, or otherwise afflicted. Those motions of the limbs and body which require little or no effort constituted the greater part of the exercises; trunk movements, marching and respiratory gymnastics, were included. The boys were instructed in the savat, the French style of boxing, in which the feet as well as the hands are used. The physical deformities of the children were lessened, the resistance to disease apparently increased, and inherited and acquired defects largely remedied. Eleven pupils became exceptionally well developed, their growth exceeding the average of children of their age. One boy grew four centimetres and three other sickly pupils became rapidly healthy. In every case, a manifest impulse toward development and good health was given. For the benefit of children suffering from more severe maladies or deformities, a special course of medical gymnastics was held under the constant supervision of a physician at a primary school in the Rue Bolivar. Children were measured and treated, that the flexibility of shoulders and spinal column might be increased, the habitual deforming postures corrected, and the condition of the various organs, especially of the bones, muscles and nervous system, improved. As a result, the municipal council of

Paris has decided to establish a regular course of gymnastics at one of the leading primary schools.

"The present stage in physical culture for pupils is far from satisfactory. The time devoted to the training is too short, the apparatus too scanty, and the whole system insufficient."—Superintendent Andrews, Chicago Public Schools.

The first grand prize at the Paris Exposition was awarded to the exhibit of the New York City schools.

BOOK NOTICES AND BIBLIOGRAPHY.

Dietary Studies of University Boat Crews, by Professor W. O. Atwater and A. P. Bryant. U. S. Dept. of Agriculture, Office of Experiment Stations, Bulletin No. 75. Government Printing Office, Washington, 1900.

In this bulletin Professor Atwater and his assistants give the results of diet studies made upon the Harvard Varsity and Freshman crews at Cambridge and at Gales Ferry, upon the Captain of the Harvard Freshman crew at Gales Ferry, and upon the Yale Varsity crew at New Haven and in their quarters near Gales Ferry, during the spring of 1898, preceding the annual races of the Harvard and Yale crews at New London.

The food eaten by the crews was carefully weighed and the composition calculated or analyzed. The results may, therefore, be depended upon as exceptionally exact. Some of the results of this study are given in the following tables: Table I is adapted from the tables of Atwater and Bryant; Table II (16) is reprinted in full.

TABLE I.

AVERAGE RESULTS FROM A DIETARY STUDY OF THE HARVARD UNIVERSITY CREW.

[Nutrients and fuel value per man.]

	Protein. Grams.	Fat. Grams.	Carbo-hydrates. Grams.	Fuel value. Calories.
Average animal food per day	117	159	34	2,100
Average vegetable food per day	44	16	378	1,870
Average beverages per day	1	...	37	160
Average nutrients per day	162	175	449	4,130

TABLE II. (16)

SUMMARY OF RESULTS OF DIETARY STUDIES OF UNIVERSITY BOAT CREWS AND OTHER DIETARY STUDIES.

[Nutrients in food actually eaten per man per day.]

	Protein. Grams.	Fat. Grams.	Carbo-hydrates. Grams.	Fuel value. Calories.
DIETARY STUDIES OF UNIVERSITY BOAT CREWS.				
Harvard University crew at Cambridge	162	175	449	4,130
Harvard Freshman crew at Cambridge	153	223	468	4,620
Yale University crew at New Haven	145	170	375	3,705
Harvard University crew at Gales Ferry	160	170	448	4,075
Harvard Freshman crew at Gales Ferry	135	152	416	3,675
Yale University crew at Gales Ferry	171	171	434	4,070
Captain of Harvard Freshman crew	155	181	487	4,315
Average	155	177	440	4,085
SUMMARIZED RESULTS OF OTHER DIETARY STUDIES.				
Football team, college students, Connecticut *a*	181	292	557	5,740
Football team, college students, California *b*	270	416	710	7,885
Professional athlete, Sandow *c*	244	151	502	4,460
Prize Fighter, England *d*	278	78	83	2,205
Average of 15 college clubs *e*	107	148	459	3,690
Average of 14 mechanics' families *e*	103	150	402	3,465
Average of 10 farmers' families *e*	97	130	467	3,515
Average for 24 mechanics' and farmers' families *e*	100	141	429	3,480
Average of 14 professional men's families	104	125	423	3,325
DIETARY STANDARDS.				
Man with moderate muscular work, Voit *f*	118	56	500	3,055
Man with moderate muscular work, Playfair *f*	119	51	531	3,140
Man with moderate muscular work, Atwater *f*	125	...	...	3,500
Man with hard muscular work, Voit *f*	145	100	450	3,370
Man with hard muscular work, Playfair *f*	156	71	568	3,630
Man with hard muscular work, Atwater *f*	150	...	...	4,500
Man with severe muscular work, Playfair *f*	185	71	568	3,750
Man with severe muscular work, Atwater *f*	175	...	...	5,700

a Connecticut (Storrs) Sta. Rpt. 1891, p. 128; *b* Unpublished material; *c* Connecticut (Storrs) Sta. Rpt. 1896, p. 158; *d* Medical Times and Gazette, 1865, I, p. 459; *e* U. S. Dept. Agr., Yearbook 1898, p. 450. The results are summarized from Connecticut (Storrs) Sta. Rpts. 1891 to 1897, and the bulletins of this Office; *f* From a summary in U. S. Dept. Agr., Office of Experiment Stations Bul. 21, pp. 206-213.

These studies will undoubtedly throw light upon the question of the proper diet for young men in training. It cannot be questioned, however, that some of the diets are largely excessive. The notions with regard to the value of meat for training are undergoing change, and the value of carbohydrates in furnishing muscular energy is being more widely appreciated.

The degree to which over-feeding can be carried, is shown by the diet of the foot-ball team of California, which gives the enormous amount of 270 grams proteid and a total fuel value of 7885 Calories as the daily average. Professor Atwater's standards are considered high by most physiologists and doubtless do not represent minimum efficient diets. We need now individual studies, especially in relation to the amount of work done, the character of the excretions and the condition of the vital organs during the work. The task of collecting and studying the data is enormous, but it is to be hoped that the government will undertake it since the results will be of the utmost value, not merely from the standpoint of a training diet but rather as aiding to determine the best diet for sustained maximum neuro-muscular effort, as regards economy of digestion and assimilation of food and especially the avoidance of irritation of excretory organs or poisoning of the system by overwhelming doses of oxidation products. It has been demonstrated by Dr. Darling and others that in sustained muscular effort, as in a boat race, the kidneys become congested and in a condition much resembling acute nephritis. A diet rich in proteids, however, has been hitherto adopted for training, as shown in the University Crew Diet Study, in which we find more energy derived from animal food with its high percentage of proteid, than from vegetable with its corresponding low percentage of proteid.

It has been pretty conclusively demonstrated by physiologists by studies upon men and animals during rest and exercise when in nitrogenous equilibrium, that the proteid requirement is but slightly increased by exercise up to the physiological limit, i. e., within the limits of endurance of the individual, and that the animal body has very little storage capacity for proteids, so that proteid as food in excess of the physiological need, is oxidized in the body and thrown to the kidneys for excretion, while the fat (or starch, etc.), if in excess, is saved for storage as fat. Whether the condition of irritation of the kidneys shown by Dr. Darling, is due to the overdose of proteid oxidation products, urea, etc., primarily, and could be avoided by a reduced amount just before the

race, or whether it is dependent upon the excessive exercise and so necessitates a strict control of the amount of proteid food taken during training and especially at the time of greatest exercise, is still to be experimentally determined, but all these points are susceptible of investigation.

Professor Atwater is to be congratulated upon the opportunities he is using so successfully in the prosecution of these studies.

G. W. F.

MONATSSCHRIFT FUR DAS TURNWESEN, BERLIN, 1900. VOL. XIX.

No. 4 (April). Gymnastics in the Swedish Public Schools, by Dr. med. F. A. Schmidt (continued in Nos. 5 and 6. Begun in No. 3). The German Turnlehrerverein: an Article Based on the Annual Reports of its Branch Societies.

No. 5 (May). The German Turnlehrerverein: Report of the Executive Committee for the Three Years Preceding Whitsuntide, 1900. Fourth Annual Report of the Hanover Turn-Klub's Section for Exercises in the Open Air.

No. 6 (June). The Request for the Restoration of Ancient Gymnastics Presented to the German Emperor Maximilian II. by the Physician Hieronymus Mercurialisin 1573, by Dr. Karl Wassmannsdorff. Ten Years of the German Movement for Youthful Sports, by von Schenckendorff.

No. 7 (July). An Ancient Jumping Track (at Olympia), by Dr. I. Küppers. The II. Congress and the XIV. General Gathering of German Teachers of Gymnastics, at Magdeburg, June 3-5, 1900, by Leo Albrecht. Swedish Gymnastics in Berlin, by Küppers. The Teachers' Course in Games, at Frankfurt a. M., May 25-June 2, 1900, by Zobel.

F. E. L.

DEUTSCHE TURN-ZEITUNG, LEIPSIC, 1900. VOL. XLV.

No. 17 (April 26). Italian Gymnastics, by Gustav Retzdorff. Life Memories, by Carl Euler (continued in Nos. 19, 20, 23, 29. See also No. 7). The Gymnastic Festival in Frankfurt, October 8, 1899 (concluded from No. 16). The Swiss Gymnastic Confederation at the Beginning of the Year 1900.

No. 18 (May 3). Turnvater Ludwig Jahn as a Master of Language, by Dr. Burgass. A Combination of Tactics and Indian Club Exercises, by M. Hirt. The XIV. Gathering of German Teachers of Gymnastics, in Magdeburg, June 3-6, 1900, by Chris-

tian Kohlrausch. Gymnastics in the Bavarian Diet. Obligatory Exercises for the Gymnastic Contests at the Paris World's Fair, July 29 and 30, 1900.

No. 19 (May 10). Broad Jumping with the Pole. Groups of Exercises on the Horse, and with the Flying Rings.

No. 20 (May 17). Human Walking. Memorial Tablets for the German Gymnastic Festivals at Koburg, Munich, Breslau and Hamburg, by F. Goetz. Groups of Exercises on the Parallel Bars and the Double Parallel Bars. The German Turnlehrerverein: An Article Based on the Annual Reports of its Branch Societies.

No. 21 (May 24). Foreign Terms in Our Writings on Gymnastics and Games, by Pawel (concluded in No. 22). Groups of Exercises with Wands, on the Parallel Bars, and on the Horizontal Bar. Has German Gymnastics a Future in the United States? by Fritz Leser.

No. 22 (May 31). Groups of Exercises on Two Horses, by H. Munier. National Defence and the Education of the Young. The German Turnlehrerverein: Report of the Executive Committee for the Three Years Preceding Whitsuntide, 1900.

No. 23 (June 7). Adolf Grahn, by O. Piepenbrinck. A Reigen-like March with Singing, for Girls and Women, by A. Erbes. A Gymnastic Festival by School Children in Leipsic (concluded in No. 24). Gymnastics in Brazil, by Jakob Mink.

No. 24 (June 14). Attacks on our Present School Gymnastics, and their Defence, by G. H. Weber. Groups of Exercises with Indian Clubs, by Fritz Sauer. The XIV. General Gathering of German Teachers of Gymnastics and the II. Congress of the German Turnlehrerverein, at Magdeburg, June 3-6, 1900 (continued in Nos. 25, 26, 27, 28). Ten Years of the German Movement for Youthful Sports by von Schenckdorff.

No. 25 (June 21). The Question of Teachers of Gymnastics in Prussia, by Böttcher (concluded in No. 26). The Gymnastic Exercises at the IX. German Gymnastic Festival, in Hamburg, compiled by Kessler (to be continued). Water Jumping, by Conrad Böcker.

No. 26 (June 28). The Preparation of Grounds for Gymnastic Festivals, by Oswald Faber (concluded in No. 27). Groups of Exercises on the Horse, by C. Wehner.

No. 27 (July 5). What Benefits to Gymnastic Instruction Can Be Expected from the Appointment of School Physicians? by Christian Kolrausch (concluded in No. 28). A Reigen, by F.

Memes (concluded in No. 28). Gymnastic and Other Observations on Paris and the World's Fair, by Dr. Burgass. Gymnastics in Hungary, by Ferdinand Deutschländer. The Literature of German Gymnastics and Games from January 1 to June 30, 1900, by Ferd. Goetz. The Swedish Gymnasts in Berlin. Some Groups of Exercises Shown at the 28th Gymnastic Festival of the N. A. G. U. in Philadelphia, 1900.

No. 28 (July 12). The French Gymnastic Festival in Paris, June 2-6, 1900, by Johs. Temming.

No. 29 (July 19). The Semi-centennial Jubilee of the Royal Institute for the Training of Teachers of Gymnastics in Dresden, by M. Zettler. Groups of Free Exercises, and of Exercises on the Parallel Bars, Double Horizontal Bars, and Horse, by Rud. Witzgall. Statistics of the N. A. Gymnastic Union, from the Amerik. Tztg.

No. 30 (July 26). Statistics of the German Turnerschaft, as it was on January 1, 1900, by Dr. Rühl (to be concluded). Groups of Dumbbell Exercises, by H. Ehrings. Gymnastics, Sport and Championship Contests in Russia, by Rudolf Müller (to be concluded). Gymnastics in the German Burschenschaft, by Wilh. Hacker (abstract). Gymnastics in the City Schools of Hanover. The 28th Gymnastic Festival of the N. A. G. U. in Philadelphia, June 20-23, 1900.

F. E. L.

MIND AND BODY, MILWAUKEE, WIS.

May, 1900: A Review of Swedish Gymnastics, Theodore Hough; Official Program for the 28th Festival and Golden Anniversary of the North American Gymnastic Union, Philadelphia, June 20 to 25; Extracts from European Journals on Physical Training, W. A. Ocker; Women and Basket Ball; Normal and Summer-Schools; Tennis Ball; Bicycling; Bicycle Racing at the Paris Exposition.

June: A Review of Swedish Gymnastics, Theodore Hough; "Athletics Must Be Clean"; Physical Education in the Public Schools of Philadelphia, Pa.; Strength Tests of the Universities; To the Members of the Anderson Alumni Association; 28th Gymnastic Festival of the N. A. G. U.; Annual Conference of the Y. M. C. A. Physical Directors; Anthropometric Chart.

July: A Review of Swedish Gymnastics, Theodore Hough; Bar-Bell Exercises, arranged by G. Seikel; Intemperate Temperance Instruction; The Golden Jubilee, The Biennial Convention,

and the Recent National Festival of the North-American Turnerbund; Intercollegiate Strength Tests.

August: Gymnastic Outings, Dr. F. W. Dodel; Toys and Games for Children among the Ancient Hellenes, Edward M. Plummer; Gymnastic Columns in Periodicals, Fred W. Froehlich; Summer Camping for Boys, Winthrop T. Talbot, M.D.; Harvard Summer School of Physical Training; 28th National Festival of the N. A. G. U.; Physique of the Boers; The Therapy of Exercise; Summer Playgrounds in Chicago.

CHILD-STUDY MONTHLY, CHICAGO, ILL.

June, 1900: Editorials: Child-Study in France; The Chicago Laboratory for Child-Study; Methods of Teaching Physiology, Mrs. Winfield S. Hall; A New and Original System of Bringing up Children; A Talk to Girls, Alfred Bayliss; The Language of the Child and the Race, Arthur D. Cromwell; The Kindergarten —A Lesson for Rings, G. H. P.; A Rational Course of Study, Maximilian P. E. Groszmann.

THE DIETETIC AND HYGIENIC GAZETTE, NEW YORK, N. Y.

June, 1900: The Therapy of Exercise; The Bicycle and Crime; The Place for Physical Training in the School and College Curriculum, D. A. Sargent; The Philosophy of Exercise; Physique of the Boers.

July: What Effect, if Any, Does Physical Culture Produce on the Mind?; The Benefits of Cycling to Women; The Value of Physical Exercise; The Fruit Cure; Sleep; Hunger and Thirst.

August: The Hygiene Status of the Wheel; The Value of Athletics; The Abuse of Exercise; Cycling in Relation to Diseases of the Heart; Dress Reform.

EDUCATIONAL REVIEW, NEW YORK, N. Y.

September, 1900: A Synthesis of Herbart and Froebel, James Welton; Münsterberg on the New Education, Joseph Lee; The Milwaukee School System, Duane Mowry; Economics in Secondary Education, Richard T. Ely; Field Work in Teaching Sociology, Elsie W. Clews; Reform of Secondary Education in Germany, Ludwig Viereck.

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June, 1900: Teachers by the Grace of God, M. V. O'Shea; Some Data Concerning the Value of Latin as a Secondary School

Subject, Edward Thorndike; Psychology for the Teacher, Louis H. Galbraith; The Sphere of the Playground, W. M. Blount.

POSSE GYMNASIUM JOURNAL, BOSTON, MASS.

June, 1900: The Education of Mind and Morals through Physical Training, Edward H. Lindström; An Indian Athlete; Medical Gymnastics (concluded), Baron Nils Posse; A Gymnast's Epitaph, M. P. C.; Swedish Gymnastics at the Paris Exposition of 1900; Children's Brains; Dr. Mosso on Physical Education in America.

DIE KINDERFEHLER, LANGENSALZA, GERMANY.

July, 1900: The Law for Compulsory Education of Minors in Prussia, J. Trüper; The Formation of Friendships among the Members of a Public School Class, Johs. Delitsch; The Practice underlying Instruction in Manual Training and the Morality of the Child, Fritz Hehmensick; Wherein has the Prejudice of Certain Parents against the Schools for the Feeble-Minded a Foundation and How can it be Removed? Hermann Horrix; The Physiological Basis for a Rational Physical Education of Abnormal Children, J. Demoor; The Meeting of the German Association for Child-Study; The Vacation School in Jena.

THE PEDAGOGICAL SEMINARY, WORCESTER, MASS.

July, 1900: Children's Interest in the Bible, George E. Dawson; The Collecting Instinct, Caroline Frear Burk; Foundations of Nature Study, C. F. Hodge; The Reconstruction of the Kindergarten, Frederick Eby.

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Pure Food Legislation—Speech of Hon. Wm. E. Mason upon the evils arising from adulterations in food, their extent and the legislation necessary to prevent the use in food of alum, sulphuric acid, copper, salts, zinc and other poisonous substances, in the Senate, May 2, 1900. Washington Government Printing Office, 1900.

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Bolétin de Enseñanza Primaria, Montevideo, Uruguay. Nos. 5 and 6, 1899.

Bread and The Principles of Bread Making, by Helen W. Atwater. Office of Experiment Stations. Washington, Government Printing Office, 1900.

ATHLETICS AND GAMES OF THE ANCIENT GREEKS.

By EDWARD M. PLUMMER, M. D., Boston, Mass. Reprinted from the American Physical Education Review for December, 1897, March, June, and September, 1898, 61 pages. Contents: I, Athletic Games among the Homeric Heroes; II, The Olympic Games in Ancient Times; III, The Olympic Games in Ancient Times (concluded); IV, Toys and Games for Children among the Ancient Hellenes.

In this series of papers, Dr. Plummer has made a genuine contribution to the literature covering the period of Hellenic physical training. His descriptions are constantly enriched by comparisons with modern methods, showing not only a clear, classical insight, but also a sympathy and appreciation for the modern aspects of exercise, which makes his work of special value.

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MENTAL FATIGUE.

By DR. HERMAN T. LUKENS, State Normal School, California, Pa. Reprinted from two papers published in the American Physical Education Review, March and June, 1899; 25 pages, 6 plates of curves, 3 tables, paper cover.

Dr. Lukens has been a student of fatigue methods and results for several years, at home and abroad, and has summarized his study in these papers. He discusses the nature and symptoms of fatigue, the apparatus and methods of study, and the results of the study. Appended is a carefully selected bibliography of 55 titles.

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PHYSICAL TRAINING.

By EDWARD MUSSEY HARTWELL, Ph.D., M.D., Boston, Mass. This is a reprint numbering 103 pages, octavo, of Chapter XII of the Report of the United States Commissioner of Education for 1897-8, 103 pages, 3 illustrations.

Dr. Hartwell's article may be characterized as a suggestive but comprehensive sketch in outline, of the theory and history of physical education, in which he has woven together the main portions of his principal published papers. In a sense it is a reissue (though in a much condensed and modified form, owing to limited available space) of "Circular, No. 5, 1885" of the United States Bureau of Education, which is out of print, like most of Dr. Hartwell's other papers and reports.

Besides discussing the nature of physical training, and the educational value of gymnastics and athletics, the author describes the principal national systems of physical training, and briefly sketches the history of the most significant and influential recent movements in Europe and America, for the advancement of physical education, in his endeavor to show what the place of physical education is and what it should be in the modern scheme of elementary and secondary education.

Appended is an article of 20 pages, entitled "Significance of Physical Education Among the Greeks as presented in the Anacharsis of Lucian," being a translation with comment and notes of Lucian's "Anacharsis and Solon, or Gymnastics," by Charles E. Lowrey, Ph. D., librarian, University of Colorado.

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Physical Training, by E. M. Hartwell, M.D. (reprinted from Report of Bureau of Education) 1897-8, pp. 102 (487-589)	0.35	(0.25)
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Title page

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AMERICAN
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ADDRESS OF M. GEORGES DEMENY,*

GENERAL SECRETARY,

Paris.

LADIES AND GENTLEMEN:

It is under the most favorable auspices that the meetings of the International Congress of Physical Education are to be opened. The most famous personages have given us their kind support. The President of the French Republic, the King of Sweden, Oscar II, the King of Greece, Georges I, and the King of Belgium, Leopold II, have done us the honor to accept the patronage of this Congress.

The ministers of public instruction, of war and of the navy, have inscribed themselves at the head of our committee and have sent to us their representatives. M. Gréard, Vice-Rector of the Academy of Paris; MM. Liard, Rabier and Bayet, Directors of primary, secondary and higher instruction; M. Grébeauval, President of the Municipal Council of Paris; M. Brouardel, Dean of the Faculty of Medicine, together with a large number of army officers, scientists, artists and gymnasts, have given us their cordial support. The city of Paris has sent as its representative M. Escudier, Vice-President of the Municipal Council, and will honor us with a reception at the Hotel de Ville.

Foreign countries have sent us numerous delegates of high rank in physical education; the most ancient and honorable as-

*Delivered at the opening of the International Congress of Physical Education, Paris, August 30, 1900.
Translated by Rachel Kent Fitz.

sociations for the study of technical and secondary education have sent their workers among us. We thank you all for your response to our appeal and for the encouraging assurance of your good wishes; never, perhaps, has so favorable an occasion been presented for the elaboration of a permanent work and for the construction of an inventory of this branch of education, which interests the future of peoples and the happiness even of humanity.

We are surrounded by numerous causes of degeneracy against which we must fight. Excesses of labor and of luxury, artificial and enervating pleasures, unhealthy locations, specialization in intellectual work, the abandonment of true good for the allurements of fortune,—all these hasten our end by involving us in countless miseries. We realize that we cannot live with impunity an artificial life; nature warns us by sickness and suffering that we have passed the limit of the organism's endurance and forces us to submit to her laws, or accept the penalty of destruction.

Egoism, scepticism, indifference and effeminacy are sources of those evils and vices which will result in our ruin. Physical education is a question of life or death for city populations who no longer gain new vigor from country life.

In the midst of all these obstacles to our development, we need to regain our equilibrium, to become once more normal, and for this purpose the necessity of exercise is generally acknowledged. No one is so ignorant as not to know that existence presupposes struggle, that only thus can the integrity of his faculties and of his energy be conserved.

Having thus formulated the problem, we find two classes of difficulties in the way of its solution.

First, it is necessary by persuasion to interest in this movement of regeneration, the indifferent and the sceptical and subsequently to indicate for them the path to be followed in practice.

To do this we must have an ideal; we must have faith in our work; we must formulate as a dogma that each of us should perfect himself physically and morally, and then render to his country and to society such service as shall include when necessary even the sacrifice of his life.

The realization of this ideal necessitates our understanding the means to be employed, that is to say, the method of education. It is not sufficient to give one's self up to exercise; its

mode and measure must be regulated. The immediate effect must be salutary; the final result socially useful. Without guidance, without education, we fall into excesses which are sometimes worse than abstention; we expose ourselves to the danger of dissipating our energies in sterile efforts and in transforming into evils what should be the source of richness and fecundity.

We all feel the need of joining in this movement of regeneration, but we feel also the indispensable necessity of a guide, of a doctrine which, by its clearness and precision, will make all doubts disappear, all hesitation vanish, and will give us a degree of force which the isolated efforts of individuals and the division of opinion can never bestow.

Nobody, it is true, has a right to say that he possesses the true methods of education; the beliefs and opinions of all workers are worthy of respect, but they possess vital interest for us only if experience has proved their justice and truth.

Our limited understanding is easily entangled in prejudice and error, and this is one cause for the divergence of opinion.

A new road must be opened, sufficiently broad and safe for all workers, where their advance will be unhindered by any considerations of personal interest, or by the petty disputes of schools. To accomplish this, we must question facts, amass documents, and by coördinating them, disengage laws.

We must construct our education upon a plan which shall correspond to the organization of man and to the necessities of social life. This necessitates, in a word, a synthesis of the results of experimentation from the standpoint of the human perfection which we ought to attain. All our work, all our effort, should converge upon this synthesis and the more perfect this convergence, the greater will be the precision of our method, the power of our system of education.

This is the essential point, the *raison d'etre* of this Congress.

The work of concentration grows greater each day and in every country. In the last 25 years a new intellectual condition has come to pass. Previous to that time the programme which has been submitted to you would never have interested or attracted the public.

This Congress therefore marks the interesting epoch when man recognizes that he may apply to himself those sciences which contribute to the attainment of his perfection, and resolves to struggle systematically against the causes of degenera-

tion which threaten to engulf him. The path is open, the idea is making its way along it. The impulse has actually been given and the movement needs only greater acceleration; it is thus impossible to check today what it was formerly difficult to generate.

Since education has a dominant influence upon our destiny, the rôle of the educator should be considered as of supreme importance, and the educator himself raised to the position which he deserves.

The educator is a practitioner before he is a theorist; that is the secret of his strength. The most modest practitioner is interesting whether he contributes a new fact or simply the result of his experience.

When there came to him the curiosity and the desire to know the reason which underlay his practice or the cause of his lack of success, he went to the scientist and demanded of him an explanation. But the scientist was not always sufficiently prepared to give the desired explanation. Not having been trained in practice, he was tempted to reason *a priori* instead of penetrating into the results of experience, and often the practitioner was indeed disillusioned by not having gained from the scientist the direction which he sought. He therefore laid to the charge of science, the impotency which should have been imputed only to the insufficient science of the theorist.

This condition of affairs is indeed to be regretted, since it has resulted in distrust which has for a long time separated the educator and the scientist. The task of the educator was indeed ungracious, since he was placed between the practitioner and the theorist, and was misunderstood and sometimes scorned by both. He therefore needed a lively confidence and a spirit of self-sacrifice which would enable him to persevere in a path which promised him no outlet, either in university or in private education.

This new class of scholars, whose aim it is to apply to the perfection of man scientific knowledge, will be obliged, before being able to organize itself, to undergo a fate similar to that of the agriculturists, who sought to teach the cultivator the truths of zootechny, which today is recognized as a science, but which for a long time was ignored and remained in the hands of some few investigators.

The fusion of science and of education is thoroughly necessary, but to insure useful results its accomplishment must be

looked for only in an experimental field; otherwise, we run the risk of being led astray into utopias and theories more dangerous even than empiricism.

Science is still much more often applied to the destruction than to the perfection of mankind; it is not therefore astonishing that the healthful results which it has been able to produce are negative. It is, nevertheless, through this intimate alliance between the practitioner and the scholar that progress must be born. The former's discussions of sentiment and the latter's theoretical views are sterile and perpetuate importunate disagreement. The practitioner has every interest in investigating scientific experiences, the scholar finds in the application of the biology of the perfection of man an immense field for cultivation, and it is through a constant control of the results that present methods may be ameliorated.

The transformation of ideas is accomplished slowly; reforms should be accomplished in the same manner; far be it from us to think that by a complete demolition of present conditions we can produce a permanent amelioration thereof. We have inherited from the toilers who are now dead a patrimony to which we owe a grateful consideration.

The science of education is being born; it is represented here by its most eminent defenders; it has made such progress and has acquired such numerous partisans that it is no longer a question of discussing its existence, but of contributing new facts and new conquests which confirm its reality.

The difficulty of interesting and of convincing men through scientific reasoning is due to the fact that we are face to face with conditions which have been established and consecrated by many generations.

Truth would be accepted without discussion if there existed no other method; systematic opposition is due to the same cause, as shown when the inventor attempts to suggest laws to the cultivator.

Happy are the industries which at their birth can rely upon a science already created and benefitted by scientific method as is the case in electricity. Physical education has not had this good fortune because of the tardy birth of physiology.

But this is merely a question of time since there is no reason why the scientific method when applied to education should not produce as positive results as it has produced in other branches of human knowledge. To suppose the contrary would be the

negation of common sense, and the time will come when we shall laugh at the naïveté of the objections which have been opposed to this quite natural application.

The only valid objection is that scientific method requires new exertion, and like the lazy child, we prefer to put off our work until tomorrow.

This application is nevertheless urgent. The most elementary principles of mechanics, which are mere play for a mechanical scholar, are misconstrued or doubted when it is a question of applying them to the human machine. We find in official manuals, classifications of exercise as infantile as were the first classifications of naturalists. Often merely the external form of movements is taken into consideration. Exercises which have the same external form are considered as identical, even when they have absolutely distinct effects and mechanism. Conversely, movements which are seen by the careful analyst to be identical are pronounced to be different and consequently to be indispensable, solely because they are executed by means of pieces of apparatus which bear different names, although necessitating the same efforts more or less varied in form.

The gradation of exercises is based therefore upon the apparatus upon which they are executed. Movements are distinguished as being with or without apparatus, or with portable or fixed apparatus, instead of being classified in accordance with their effects upon the human body.

We might as well regulate our nourishment, not by the nutritive properties of the food, but by their tastes, and be satisfied to absorb without question a single substance, provided its seasoning were varied!

These are some of the reefs which we should avoid, but there are still others.

Physical education was born of athleticism, but athleticism is physical education carried to excess. The aim of athleticism is not sufficiently educative, nor its scope sufficiently broad to constitute a method in education.

A few athletes can never render to their country the services of a fecund population enured to toil, and to fatigue, with confidence in their power and having an ideal of morality.

The cultivation of force for the sake of force is a primitive aim when it is not immoral or unhealthy. Force is not everything; the idea which directs it is at least of equal importance. Force without an accompanying idea is like muscle without

brain. There are domestic animals which have greater muscular strength than we, but which are nevertheless our slaves because they are our intellectual inferiors.

It is not therefore the athletes to whom we must look for the advancement of the doctrines of physical education. Men of rare intellectual attainment without vanity must make it their task to extend to children, to invalids, to the sick, the benefits of exercise, if they wish to see generalized the processes of physical education.

Military gymnastics has been the first application of athleticism, and it is in the defence of fatherland and of personal safety that the immediate application of acquired force is found.

But for a long time we have committed the error of transferring to the school the methods of athletics, and experience has shown the pitiful consequences resulting therefrom.

Teachers coming from athletic or military schools must have brought about this confusion of method, and this is the reason why pedagogy in the school has had so much difficulty in establishing itself and remains still in hopeless uncertainty.

Teachers well endowed and full of zeal have, in France at least, no other pedagogic qualifications than those which they have attained themselves, and the education which responds especially to skill and to audacity is manifestly insufficient from the point of view of hygiene and of the normal development of the child. This error will cease when we recognize with the biologist, that the child is not a man in miniature, but a being in a state of formation and development.

Certainly we have at our disposal very varied means provided that we know how to adapt them to the required purpose, but it is indispensable that we should know their effects, that we may be able to produce them at will and to apportion them rightly.

Progress is to be sought in the attainment of a judicious proportion between the various kinds of exercise, and not in the invention of new machines. There are actually enough materials for construction; what we need is harmonious concord between means and end, and this can be obtained only by scientific method.

Among the innumerable existing combinations of exercise possible for the human body, all are not good; some, for example, are anodynes, some useless, some harmful, some grotesque, some dangerous. In a method of education only those must be

retained which actually contribute to the attainment of perfection and are in conformity with the human organism and the necessities of life.

There is no need of occupying ourselves especially with the size of muscles; that is the infancy of art. The bony framework should be straight and well balanced, the functions of the organs active and harmonious, and as the important and final result we should consider the degree of resistance offered, the skill in producing labor, the mechanical utilization of energy, and should seek to obtain an equilibrium between the physical and moral forces.

The value of an education is measured by the degree of perfection which it produces; but this is not all since the benefits of education should extend to the professional and artistic callings.

The rules of education are general; the relative proportion between labor and rest, the rhythm of movement, the economy of force, progression in effort and in the distribution of toil, the coördination or memory of movements, all these influences are to be considered if we seek to attain in the professions a maximum of efficiency with a minimum of fatigue.

In the artistic professions there is a large proportion of actual labor; in design, music and the dance, the rules of education find their immediate application.

Reciprocally, the professions should be considered if not as means of physical education, at least as a means of furnishing to them interesting elements.

Many of the manual professions demand great energy and recognize therefore the need of exercise; among the artistic professions dancing and music when associated may become almost a complete system of gymnastics in the most attractive form for young girls.

The art and the science of education thus afford each other mutual support.

Art should animate gymnastic education since science alone cannot make it live, and it is to this fact that we desire particularly to call your attention. But inasmuch as the arts have been formed independently one of the other, it will take time for practitioners to agree upon the rules of education common to them. When this agreement shall have been attained (and we ask you to assist in its attainment) we shall obtain results of which we cannot now see the full significance.

A pleasant aspect of the situation from which we may draw encouragement is the interest which women seem to take in our discussions.

Many groups of women have sent delegates to our Congress and have submitted to the programmes of their reunions the question of physical education. Our duty is to encourage this movement and to propagate among them the truths which we have acquired, since if we can succeed in winning over the mother of the family, our cause is won.

Woman, they say, is more readily convinced by sentiment than by scientific reason, but all which is true and which we believe needs expression in one tongue, I was going to say in one special jargon, possesses objective manifestation; it is a tangible fact which has another name among the artists; it is the same thing expressed differently, since physical perfection corresponds for the artist to an ideal of beauty. Let us make the healthy, true beauty of the ancients loved and women will then understand the benefits of physical education, since it alone contributes grace, elegance and form, such as neither the art of the modiste nor the rouge and ointments of the chemist can give. Here, again, science and art meet and mingle together.

GENTLEMEN,

The period of uncertainty is at an end and we may resolutely enter upon the scientific way which the Swede, the German and the American have marked out for us. We may congratulate ourselves; our problems remain henceforth in the hands of investigators and experimenters.

We have indeed lost years, but such is the law of things. Blind resistance may retard the evolution of an idea, but can never wholly check it. Truths cannot be stifled; they are often scattered, only to reappear in ways which it is impossible for the most clear-sighted to foresee.

We have arrived at this period of light; in all the elements of systematic gymnastics, of games and spontaneous play, we must avoid excess, we must retain that which is really good and classify the means and conditions of obtaining directly, in the shortest possible space of time, and among the greatest number, undeniable human perfection.

Let us render justice to the practitioners, to whom we already owe noteworthy results; they deserve so much the more credit in that they have often obtained them without a guide and with-

out having a thorough knowledge of the human body. Let us aid them in the accomplishment of their task, for they have taught us much.

The work of the Congress is not a work of criticism or of discord, but of encouragement. Far be it from us to think of renewing the disputes which formerly took place between the Germans and the Swedes. Our armor is truth and the conviction which evidence brings us.

In our reunions, workers will learn to know and to appreciate one another. We are strong in the hope that harmony and a definite forward movement will result.

We should conduct our discussion upon the courteous and impersonal plane of scientific truth, the only plane where we can venture with security to walk toward the unknown.

Thus conducted, the work of the Congress will not have the fleeting existence of a fête or of an assembly which ceases to exist when its members are dispersed. On the contrary, it will be perpetuated, and will be the point of departure for a general movement.

Our programme is sufficiently exhaustive to occupy numberless years and numberless workers.

We extend to the representatives of foreign lands and to the delegates of the associations here present, whose number does not permit us to address them individually, a most cordial welcome. We thank them for having come from distant countries to take part in our discussions. We find among our compatriots old companions in our fight against error, friends whom we esteem and trust. We find among us also, new faces, the younger generation, who wish to learn. The results obtained by this concourse of friends and well-wishers cannot but be satisfactory. We shall be recompensed for our labor if we have been to any degree successful in attracting the attention of individuals and of governments to the science of the perfection of man, a science which has indeed been neglected, but which is nevertheless the most important of all sciences; we shall be recompensed if we hasten the decisions so impatiently awaited; if in a word we have served the great cause of physical education which we all have at heart and which is a path to universal peace.

THE STOCKHOLM NORMAL SCHOOL OF GYMNASTICS.

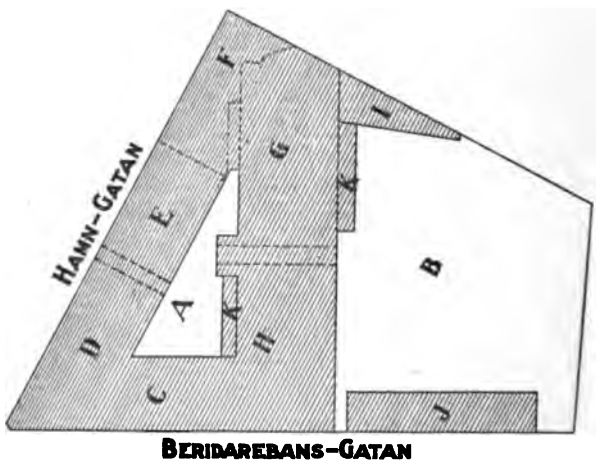
FRED EUGENE LEONARD,
Oberlin, Ohio.

Whoever desires to understand the system of physical training developed on Swedish soil and introduced into all the educational establishments of that country must begin at the source, the normal school, to which every teacher of gymnastics throughout the length and breadth of the land owes directly or indirectly his special preparation. A relation of some facts regarding its buildings and equipment, organization, teaching force, pupils and courses of study ought also to interest the growing body of graduates from our American normal schools of physical training, and may serve as a basis for comparative study.

The Plant.—Leaving behind him the cluster of rocky islands which once held all there was of Stockholm, and passing north on the mainland through one of the linden-bordered promenades of the "King's Garden," the visitor soon reaches Hamn-Gatan, its farther limit. If he turn to the left along this busy thoroughfare his eye will be caught by a steep hill just ahead, and at its summit a slight bend of the street to the right reveals on the south side a low and very plain two-story building, constructed like the most of its neighbors, of large bricks coated with plaster over the entire free surface, and painted a weather-worn buff. From the crest of this hill the ground is seen to fall away rapidly on the other side, so that the building gains an additional story at its corner on Beridarebans-Gatan. Near the centre of the Hamn-Gatan front is a large archway, and over this in raised gilt letters are the words "Kongl. Gymnastiska Central-Institutet," plainly the Swedish equivalent of "The Royal Gymnastic Central Institute." Entering the archway and passing through the double gate which guards it midway, one emerges into a triangular paved court, surrounded at the right and in front by buildings of the same structure and color as the one first noticed. Across the court and a little to the left a second archway bisects that side and leads through the projecting central portion into a large, irregularly quadrilateral graveled yard, with a small one-story building at its nearer left hand corner,

and on the right a low shed about 80 by 30 feet, open at the sides, except where a high wall separates it from Beridarebans-Gatan. This shed has a corrugated iron roof and a floor of smooth concrete, and contains a variety of gymnastic apparatus. The yard itself measures not far from 100 feet in either diameter. Its south and east sides, meeting at an obtuse angle, are formed by buildings which stand on adjoining property.

The north front stretches for 200 feet along Hamn-Gatan. Beridarebans-Gatan crosses this street obliquely, the two forming an acute angle in which the property of the Institute lies. This explains its unsymmetrical arrangement; for half way down the Beridarebans-Gatan side, which measures 240 feet, a



building 40 feet wide has been carried in at right angles to that street, meeting the front portion at the east point of the paved court, as shown on the accompanying diagram, and separating the court (A) from the graveled yard (B) at the rear. The three-story sections marked C and D contain living-rooms for some of the teachers and for the servants, together with a few dressing-rooms on the ground floor. In the lower story of E patients receive free treatment with medical gymnastics, and higher up are the library and a reading-room connected with it, a larger and smaller lecture-room, two small rooms for student use, and others for the storage of anatomical collections, etc. A hallway with racks for coats and hats leads from the court into the men's dressing-room (F), and an adjoining room is supplied

with shower baths. G and H are two lofty stories in height, the ground floor of each occupied by a large hall equipped for the exercises in pedagogical and military gymnastics, and over these two other halls employed for purposes of instruction, for exercises in pedagogical gymnastics, and for the application of medical gymnastics to patients who pay for the treatment received. Communicating with the halls are various dressing-rooms, coatrooms, etc. I is intended for practical exercise in anatomy, J is the shed with gymnastic apparatus, and KK are lean-tos where schoolboys who visit the Institute for their gymnastic lesson may store their slippers and hang their coats and caps.

The Purpose.—According to the Royal Statutes which define and control its workings, the object of the Institute is to furnish young men and young women with the scientific preparation and practical skill necessary for those who intend to become teachers of pedagogical or military gymnastics, or practitioners of medical gymnastics. It also supplies gymnastic instruction to the pupils in certain schools, and treats with medical gymnastics such cases as seem likely to be benefitted by that means.

Control.—The general control is vested in a Board appointed by the King and composed of a president and three other members, of whom one must belong to the army or navy, one must be a teacher (*skolman*), and one a physician. The corps of instruction includes a head teacher and a second teacher in each of the three departments, the hygienic or pedagogical, the military, and the medical; two women teachers, one of them in hygienic and the other in medical gymnastics; and extra teachers, both men and women, as these are required. From among the head teachers the King selects one to act as Director of the Institute, in immediate charge of its instruction and order, and of the buildings and their contents. This appointment is for five years, and is renewable. Those who have filled the office of director since the founding of the Institute, in 1813, are: Pehr Henrik Ling, 1813-1839; Lars Gabriel Branting, 1839-1862; Col. Gustav Nyblæus, 1862-1887; and Lars Mauritz Törngren, the present incumbent, appointed upon the retirement of Nyblæus in 1887.

Teaching Force.—At the present time the teachers are: Professor Törngren and Major Carl O. A. Silow in hygienic (pedagogical) gymnastics, Lieut. Col. Viktor G. Balck and Capt. Otto E. Scherstén in military gymnastics, Professor Robert Murray and Dr. Astley Levin in medical gymnastics, Misses W. L. U.

Andersson-Falck and S. Högström in the course for women, and in addition to these seven extra teachers, two of them women, one a physician, and the others officers in the army,—a total staff of fifteen persons. The Royal Statutes require that all who give instruction at the Institute shall be graduates from its courses.

Courses.—The school year, divided into a fall and a spring semester, begins on the 15th of September and closes the 25th of May, with an intermission of two weeks at Christmas time. For male pupils there are three courses: (1) An *"instructor's course,"* completed in one year and giving to him who has finished it the right to teach gymnastics in the "folk schools" or in one of the lower secondary schools (lagra allmanna läroverk); (2) a *"gymnastic teacher's course,"* completed in two years, the first of which corresponds with the instructor's course, and making the graduate eligible to a position as teacher of gymnastics in any public educational institution, civil or military, in the country; (3) the *course in medical gymnastics,* which presupposes the completion of the gymnastic teacher's course and requires one additional year. For students of medicine who wish to be trained as medical gymnasts the prescribed courses may be shortened. Pupils who have successfully completed the entire three years of study and practice, and physicians who complete the course in medical gymnastics at the Institute, may assume the title of "Gymnastic Director." It should be added that in Sweden no person is allowed to give treatment by means of medical gymnastics, except in cases where a duly authorized physician has prescribed it in writing, provided, of course, the medical gymnast is not himself a physician.

The instruction for young women, owing to the smaller range of practical exercises, is so arranged that both the gymnastic teacher's course and that in medical gymnastics can be completed in two years, and the pupil then acquires a right to the title of gymnastic director.

Pupils.—The male pupils are for the most part young army or naval officers who have received orders to take the course at the Institute. The balance consists of under officers in the army, and of young men in civil life who have passed such an examination as would entitle them to admission into either one of the national universities. A similar examination is required in the case of every man who enters the military service as an officer, and hence the intellectual average of the student body is

a high one. Other requisites are a sound constitution and some talent for gymnastic exercises, and with a possible exception in the case of physicians no one over 30 years of age is admitted. The actual average of ages is said to be 23 or 24 years. In the fall of 1900, out of 16 men in the second year class there were 11 officers in the army, 2 in the navy, and only 3 men in civil life; out of more than 30 in the first year 2 were officers in the navy and 7 were in civil life. The total number of men in the three courses is commonly about 60.

Young women are admitted as pupils upon presentation of certificates which would allow them to enter the national Higher Seminary for Women. The rule has been to receive beginners every second year only, but this fall the work of both years is given, and the two classes together contain more than 50 members, about double the number usually present at any one time hitherto. Foreigners are admitted to the Institute within certain limits, and of the men in attendance during the fall of 1900 two were from Greece and one each from Norway, Denmark, Finland and the United States, while Russia, Holland and England were represented among the women at the same time. There are no charges for tuition in any of the courses.

First Year.—Work begins on Monday morning and continues through Saturday afternoon, as in other Swedish schools, for Sunday is the only holiday. The theoretical courses come at 9 and at 1 o'clock, and the practical courses at 7, 11 and 2. At 10 o'clock 300 boys from the New Elementary School visit the Institute to receive their gymnastic lesson in three of the large halls, affording material for practice in teaching; and at 3 about 200 more arrive from the Jakobs Secondary School, giving an opportunity to pupils who did not assist in the morning. The hours between 8 and 9 and 12 and 1 are free, and there are no exercises after 4 o'clock.

The *theoretical courses* of the first year men are, most of them, given in the larger of the two lecture rooms, with the pupils seated at either side of a long table and the teacher at one end. They include:

(1) *Anatomy*, three times a week through the year, with Dr. Wallgren. The lectures and recitations are upon the subject of bones, ligaments and muscles, and the text-book in common use is T. J. Hartelius's manual of about 275 pages, a book resembling the average Quiz-Compend prepared for American

medical students. Illustrative material is shown by the teacher, but the students themselves do no dissecting until the second year.

(2) *Physiology,* twice a week during the second semester only, with Dr. Levin. The course is based upon a study of 100 pages in another small manual by Dr. Hartelius, including the histology of cells, tissues and the organs of digestion, circulation, respiration and elimination, and the physiology of digestion and absorption, the circulation, respiration and excretion.

(3) *Theory of Pedagogical Gymnastics,* twice a week through the year, with Major Silow. Among the topics included in his course are preliminary definitions and general rules, a description of various positions and movements, the commands for them and the common faults, based on a pamphlet which contains 21 "Tables" prepared for use at the Institute, the arrangement of exercises in a lesson, progression in each lesson and from day to day, and exercises without apparatus.

(4) *Military Gymnastics,* twice a week during the first semester, with Lieut. Col. Balck. The lectures include among other things a description of the different military training schools in Europe.

(5) *Theory of Fencing,* twice a week through the year, with Lieut. Col. Balck. His 200-page manual on fencing with foils is used as a basis for recitations, explanations and demonstrations.

The *practical courses* are given in the large ground-floor hall communicating with the men's dressing-room and marked G in the diagram. This hall is about 77 feet long at the sides and 37 feet wide, and provided with arc and incandescent lights in addition to the ten great windows at the north and south. A doorway leads from the narrow gallery at the west end into a similar room adjoining, and another opens into the gravel yard through a lean-to at the rear. The pine floor, kept very clean, is unobstructed by fixed apparatus of any sort, and there is no such thing as a gymnasium mat to be seen. From end to end of either lateral wall stretch the stallbars, 44 sections of them altogether. Two sections near the centre are carried up on each side almost to the high ceiling, with wider spaces between the bars, serving thus as vertical ladders. There are seven booms (Swedish horizontal bars), one of them standing by itself and the others arranged in two sets of three each. The single boom has one post fixed to the wall between adjacent stallbar sections

and the other hinged at the base so that when not in use it can be folded over, dropped with its two bars into a slot about 18 inches or two feet deep, and concealed from view by trap-doors, which form a part of the gymnasium floor. Of the two sets of booms each has four posts arranged in a line across the room, two of them wall posts and the others hinged in the manner described and dividing the distance between the walls into three parts. The third boom in the set is formed by placing bars between the two hinged posts. At one end of the room four Swedish ladders are suspended, two of them 13 spaces high and three broad, and two 11 spaces by 3. They can be fastened together in pairs; 14 climbing ropes hang in a line across the room, and on either wall at the ends of the line is a peg-post or ladder, its rungs projecting from the opposite sides of a central beam. Four longer ropes have the upper end attached to the ceiling close to one wall, and the other can be fastened by means of a hook and pulley to a large eye in the opposite wall near the floor. There are also eight rope ladders in two sets, and eight climbing poles, all arranged, like the rest of the suspended apparatus, to be drawn up or back out of the way when not needed. Three Swedish horses, a vaulting box, a buck, seven long benches with the brace on the under-side serving as a balancing beam when they are turned upside down, and a half-dozen bar saddles complete the list of apparatus for use in pedagogical gymnastics. The practical courses include:

(1) *Hygienic or pedagogical gymnastics,* at 7 A.M., six times a week through the year, with Major Silow. The first and second years meet together for this work, and are joined by some of the third year men also, forming a class of more than 50. A few minutes after the hour they form in two ranks down the room, the smallest at the centre and the larger ones at either flank, and then the ranks are open into four or six lines, facing one end of the hall. The exercises which follow are grouped according to the usual Swedish "day's order" and include, after various introductory movements, some exercises with the trunk arched backward, usually at the stallbars; a heaving or climbing exercise; balance movements; exercises for the back and shoulders; others for the abdominal muscles; a run of 2-5 minutes, preceded by marching and followed by more marching and a brief rest; rotations and sideways flexions of the trunk; a second heaving or climbing exercise; vaulting and jumping, and finally some quieting exercises accompanied by deep respiration.

Other movements of less pronounced character are interspersed from time to time to correct the standing position, remove unpleasant sensations, or restore the equilibrium of circulation and respiration. At least a third of the hour is given to the heaving and vaulting exercises, and for these the class is divided into two sections, Professor Törngren taking charge of one of them. This, with the run, means good vigorous work, but so arranged that when the Major bids his pupils "good morning" at 8 o'clock one leaves the room with no feeling of fatigue.

(2) *Fencing with foils,* at 11 o'clock, six times a week through the year, with Lieut. Col. Balck, Capt. Scherstén and assistants. The first and second year men meet together for this exercise also. The method adopted is a combination of individual instruction with work in squads, where each man faces an opponent. The members of the class are distributed among four regular instructors, aided on four days in the week by certain of the second year pupils. Not more than three or four are assigned to one person for individual instruction therefore, and at first the teaching is almost wholly of this sort. Later the squad leaders often place their men in opposing lines during a part of the hour, and call for a definite order of thrusts and parries. When the work is well started the first year men meet by themselves two days a week for practice in teaching. An instructor explains and illustrates certain positions and movements which his pupils, arranged in pairs, are required to repeat with each other, taking turns in giving the appropriate commands and criticizing the performance. The left hand, as well as the right, is used in fencing.

(3) *Fencing with sabre and bayonet,* at 2 o'clock daily through the year, under Lieut. Col. Balck and Captains Scherstén, Drakenberg and Sellén. The members of both first and second year classes meet together. At the time this article is written the men are working in two sections, one receiving instruction in sabre fencing, while the other, in an adjoining room, has a lesson in bayonet fencing, and the two changing about at the end of a half hour. Here, too, individual and squad instruction are combined.

(4) *Practice in teaching,* daily throughout the year, under the supervision of Professor Törngren, Major Silow and assistants. The 500 boys who come to the Institute for their gymnastic lesson meet, according to school grade, in one of three rooms at 10 o'clock, or one of two at 3 o'clock, and in each of the rooms

the hundred or so are subdivided into a half-dozen squads, exercising separately under the direction of first year pupils during part of the lesson, and watched and corrected by them during the exercises in which the whole roomful receives commands from a single leader.

Second Year.—The *theoretical courses* of the second year are:

(1) *Anatomy*, three hours a week, with Dr. Wallgren in the lecture room, and in addition to this, during a large part of the year, two exercises a week in the dissecting-room, the student himself making the dissections.

(2) *Physiology*, two lectures a week throughout the year by Dr. Murray, who discusses in order the blood, the circulation, respiration, digestion and the excretion of waste matter. The student is allowed to do as he chooses in the matter of text-book. Some attention is devoted to the subject of hygiene.

(3) Lectures on *kinesiology*, or the theory of movements, twice a week through the year by Captain N. F. Sellén.

(4) The *theory of pedagogical gymnastics*, twice a week through the year, with Professor Törngren. The work is based upon a second pamphlet of "Tables" of exercises, arranged for the pedagogical course at the Institute.

(5) *Medical Gymnastics*, three hours a week through the year, With Dr. Wallgren. During the first semester the instructor occupies the early part of each hour with an explanation and demonstration of some of the forms of treatment, basing the course upon Dr. Anders Wide's "Hand-book of Medical Gymnastics," and the rest of the hour the students are occupied in practicing these manipulations on each other, under his supervision. In the second semester one of the three hours a week is devoted to the theory of medical gymnastics, particularly to such cases as are likely to be met with in the schools.

The *practical courses*, in addition to this work in medical gymnastics, are:

(1) *Pedagogical gymnastics*, as already described. The division of the class into two sections for the heaving movements and the exercises in jumping and vaulting allows some difference to be made in the work of the two years.

(2) *Fencing* with foils, and with the sabre and bayonet, as already described. Here again the work done by each squad depends upon the stage of progress reached by its members. Twice a week, in the presence of the same instructors, the second year pupils meet by themselves for practice in "free fencing" with foils.

(3) *Practice in teaching.* In his second year each pupil takes his turn at directing one of the classes of 100 or more school-boys for a week at a time, making out his own "day's order" for the opening exercises in which the entire class work is a unit, then overseeing the exercises of the different squads, and handling the whole roomful again during the marching and running. One of the instructors at the Institute is always present, but the student assumes all the responsibility of leadership for the time being. As there are five such classes a day, three at 10 and two at 3 o'clock, and 16 men in the second year at present, each pupil goes on duty in the manner described about every third week through the year. The second year man is also called upon to give individual instruction in foil fencing twice a week, as assistant to a regular instructor, and a somewhat similar plan is followed in teaching sabre and bayonet fencing.

Other forms of exercise, such as boxing, may be offered as extras. Though *swimming* is not included in the curriculum, no student can receive a certificate as a graduate from the gymnastic teacher's course without furnishing evidence that he possesses a satisfactory degree of skill in that art.

Third Year.—Between 7 and 9 o'clock in the morning, the third year pupils are on hand at the Institute to assist in giving treatment by means of medical gymnastics to patients able to pay for it. At 12 o'clock there are lectures six times a week by Professor Murray, on anatomy, the physiology of the muscles and nervous system, and pathology. Other patients visit the Institute between the hours of 1 and 3 for free treatment, and this again is given by the third year men, or a part of the time is devoted to instruction in theoretical and practical medical gymnastics.

Women's Course.—The work of the women is entirely distinct from that of the men, as much so as if it were given in another part of the city. According to the posted schedule, in which, however, some changes have been made this year, it is arranged as follows: 7-8 o'clock daily, practical medical gymnastics with Miss von Zweigbergk (not now at the Institute); 8-11 daily, practice in applying medical gymnastics to the treatment of free or paying patients; 11-12, instruction from Dr. Levin daily through the year, twice a week in anatomy, twice in physiology, and twice in medical gymnastics and pathology; 12-1 daily, practical pedagogical gymnastics under Miss Andersson-Falck;

3-4, the theory of movements twice a week through the year with Captain Sellén, and once a week the theory of pedagogical gymnastics with Professor Törngren. There is also daily practice in teaching gymnastics at one of two private schools, either Steffén's Preparatory School (1:10-1:50) or the Atheneum for Girls (1:40-2:10 or 2:20-2:50).

Library.—The library of the Institute contains considerably more than 5,000 volumes, besides a great number of pamphlets and articles which have been separated from the periodicals in which they originally appeared. Some of this material has nothing to do with gymnastics, a large share of it deals with the sciences on which physical training is based, but the remainder, while it includes much of present interest, is remarkably rich in the older and seldom seen literature of gymnastics. It is catalogued, stored in fire-proof rooms, and endowed with a modest sum for maintenance and increase.

Stockholm, November 10, 1900.

THE INOMOTOR.

A FUNDAMENTAL MECHANISM FOR A NEW SYSTEM OF MOTOR VEHICLES, TESTING APPARATUS AND DEVELOPING APPLIANCES.*

D. A. SARGENT,
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Some twenty years ago I came to the conclusion that certain radical changes were necessary in the aims, methods and equipment of the gymnasium in order to make it serviceable for all classes in the community. At that time I had had several years' experience in teaching gymnastics and in observing the results of their practice in two college and two large city gymnasiums. I had seen men turned away from these institutions by the score because there was nothing pleasurable or profitable that they could do. The heavy work was too heavy and exhausting; the light work was too light and spiritless, and the acrobatic work was either beyond the ability of most persons or very distasteful to them. In order to meet what seemed to me the urgent need of the times I had a great deal of the old-fashioned apparatus remodelled, and introduced the modern system of pulley weights and developing appliances. This new apparatus immediately opened up the possibilities of the gymnasium to those to whom it had hitherto been a closed institution. It sprang into popular favor at once, and every well-equipped gymnasium in the country is now supplied with this kind of apparatus. As a means for strengthening weak parts, correcting physical defects and giving one an all round development of the whole muscular system, no class of appartus can compare with the chest weights and the numerous pulley weight appliances. The principal reason why this class of apparatus is superior to all others as a means of muscular development is because by the use of the pulley, the weight or resistance to be overcome can be met or applied in all directions, and can be readily adjusted to the weakness of the weak as well as to the strength of the strong.

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*Paper read at a meeting of the Boston Physical Education Society at the Hemenway Gymnasium, Harvard University, Monday, December 3d, 1900.

But no single class of exercises is perfect in itself and there are some objections to the pulley weight appliances if depended upon solely. The exercises are apt to become a little monotonous to persons who feel that they must have some immediate object in view, like a real or imaginary opponent, in order to induce them to make any earnest physical effort. To those who have sufficient morale, and they are many, to hold themselves down to a particular line of work in order to insure their physical improvement, and prepare themselves for the anticipated joys and pleasures of a useful life, this objection of course does not count. Two better founded objections may be brought against the pulley weights as perfect forms of exercise, and it is a little strange that the opponents of the system have never discovered them, though pulley weights for exercising purposes have been in use in this country in one form or another for over 30 years. If one wishes to attain a high degree of speed and great rapidity of movement this power cannot be gained as effectively through the pulley weights as by the use of some other kind of apparatus, as the punching bag and light dumb-bells. A weight attached to a cord is always limited to the velocity of a falling body through the distance which it is raised so long as the cord is kept straight. As the cord must be kept straight in order to keep the weight from jerking it in a disagreeable manner, and as the range of the movement which the body is capable of making limits the height which the weight can rise and fall, the speed with which it can be made to rise and fall is not great enough to call forth a very rapid contraction of the muscles. The practical limit is about one stroke a second for each arm. Of course this failure of the weight to rise and fall fast enough to afford a speedy contraction of the muscles may be overcome somewhat by the use of springs or rubber cords, but this introduces another factor which is more objectionable than the first, and calls for a more extended explanation which it is not necessary to make at this time. The principal objection that may be brought against the pulley weights is one that is common to dumb-bells, Indian clubs and many other kinds of portable apparatus; that is, these forms of exercise are essentially local in their effects rather than general. It is this very fact, however, that makes the pulley weights so valuable in correcting physical defects and developing weak parts of the body. But it is possible to develop one part after another until a man becomes very strong all over, and yet be decidedly lacking in ability to make continued applica-

tion of his power for any length of time. Perhaps this is the most frequent as well as the most serious defect of well-developed men. They often acquire their general muscularity by local instalment, as it were. If called upon to bring a great many muscles into action at one time they are very much distressed for breath, and show an unwonted amount of cardiac excitement. This condition of affairs may be due to interference with respiration through excessive chest and shoulder development, or to the fact that development of the heart and lungs has not kept pace with the development of the general muscular system. A man in this condition is like a factory that has been accustomed to work but a few of its machines at one time, and has an engine adapted to that purpose. In case all the machinery is started up at once, the boiler cannot generate steam enough to supply each machine with its requisite amount of power, and consequently permits of little effective work being done by anyone of them. The remedy for the factory is to build a larger engine, or generate more steam. In the case of an individual the remedy is to invigorate the heart and lungs and, if possible, give more nerve power. The best kinds of exercise to produce these results are rowing, running and swimming, because they bring so many muscles into action at the same time. For this reason the pulley weight appliances, with their strength-giving qualities, should always be supplemented by the practice of some good constitutional exercises, like rowing, swimming, etc.

But unfortunately our climate does not permit of these exercises all the year round, and we are driven by necessity to resort to other methods for attaining this increase of heart, lung and nerve power. After several years of experimenting I have settled upon a system of mechanical devices, which are designed to meet this long felt want. (See page 319.)

As I have said before, one of the criticisms that is frequently made against the developing apparatus of the gymnasium is that the exercises are monotonous, and have no element of pleasure or excitement about them, such as is afforded by races and competitive sports and games. Realizing that this criticism is to a certain extent just, an attempt has been made to supply the element of pleasure and excitement by having some apparatus so constructed that the exercise taken with it sets it in motion, thus affording an opportunity for competition in different kinds of races on the floor of the gymnasium, as rowing, paddling, sculling, etc. By reducing the gear for indoor uses, and competitive

purposes, the apparatus may be made to record so many feet to the mile, while the same kind of apparatus may be geared up to allow of considerable speed where there is plenty of room on roads and tracks out-of-doors. Up to the present time the bicycle seems to be the only mechanical contrivance that has been used sucessfully for locomotive exercise. Various attempts have been made to propel vehicles of one kind or another by hand or foot power, either singly or combined, but for one reason or another all of these attempts have been abandoned, and today, in spite of the demand for some such mechanism, there are but very few in existence. The bicycle is about the only one that is much used. Does this meet the demands of the body for exercise and development?

Several years ago in the course of my professional experience I made a physical examination of a young and promising student. He had dark eyes, an unblemished pink and white skin, and a pair of legs that would have gladdened the heart of a sculptor. His chest and arms, however, were poorly developed and presented a pitiable contrast to his finely-lined and well-formed lower extremities. Upon my inquiring of him why he did not pay more attention to the development of his arms and chest, he calmly replied, "Arms and chests do not win bicycle races." Suffice it to say that his ambition was to win distinction as a bicycle rider, and with this end in view he made bicycling his only form of exercise. He won one or two records at that time and one year the college championship, but he died of consumption a year or two after graduating. In my opinion, the young man could have been saved from an early grave if he had devoted more attention in his college days to the development of his lungs and chest. Bicycling has undoubtedly done much to improve the health of our civilized communities, mainly by inducing many persons to take exercise who never took any before, by carrying them out into the country where they get the benefit of fresh air and sunshine, and a change of life and scene. The bicycle also teaches self-control, which is one of the first requisites of good physical training.

In order to make bicycling attractive as an exercise it has been found necessary to make it so easy that the wheels almost go by themselves. The artisan has so improved the mechanism of the machine that friction has been reduced to a minimum, and only the smallest amount of power, a draw bar pull of about four pounds for the average man, is necessary to propel a bicycle on

a good, level road. Century runs are so common that they are not only made frequently by ordinary men and women, but even by children of nine and ten years of age. The ability to cover such distances in a short space of time is not due to any sudden increase in the strength and endurance of the race, as one might infer, but is simply another tribute to the skill of the man who has modeled such a machine. It is just this factor that has made the modern bicycle an indispensable adjunct to every household as a time saving, strength conserving, useful agent. But the ease with which the bicycle can be propelled and the very few muscles which are engaged in the operation lessens its value as a means of physical exercise and development. In ordinary riding the muscles of the arms, chest, shoulders, back and abdomen have little or nothing to do, all of the work of propelling the machine after the art is acquired coming upon the extensors and flexors of the feet and legs. With most persons the arms are used simply as guides to steer with, or as props to hold the body erect. The chest muscles remain comparatively inactive, and the muscles of the back and abdomen being relieved by the arms of their function of balancing the body, may actually pine for the want of more work to do. A faulty position long maintained soon results in a permanent drooping of the head, elongation of the neck, rounding of the back and flattening of the chest, all physical defects which are now far too common. Where children begin to ride at an early age and depend upon bicycling only for their exercise, malformations are acquired, and deficiencies in growth become established which are very difficult to eradicate. My attention has been frequently called to these cases, and I have long felt the want of something outside of the gymnasium that would supplement the bicycle in affording a more perfect means of all round physical exercise.

I had long since observed in making physical examinations that the best specimens of all round physical development were, as a class, among the rowing men. Since the introduction of the sliding seat, rowing, of any single sport, undoubtedly furnishes the best exercise for the whole body. A brief analysis of the act of rowing makes this fact perfectly apparent. Let us start with the beginning of the stroke. The oar is grasped by the hands and held in place by the flexors of the fingers and wrists, which are on the forearm. In bringing the body into an erect position the muscles of the back, buttocks and hips, and hamstring muscles of the legs are brought into powerful action; then as the

feet are pressed against the stretcher and the seat is started backward on its slide the muscles of the calf and the extensors of the legs are brought into play. In the meantime the arms which are pulling at the oar are being brought backward by the contraction of the trapezius, the muscles between the shoulder blades and the latissimus dorsi, the broadest and strongest muscles of the back, which are attached to the bones of the upper arms. Then just as the stroke is finished the biceps or flexors of the arms, and extensors of the wrists, are used to pull the oar through and feather it preparatory to the next stroke. At this juncture the oar is pushed forward by means of the triceps, anterior deltoid at the shoulder, and pectoralis major on the chest, then the flexor muscles of the feet and the flexors of the legs and thighs contract to draw the pelvis forward with the sliding seat, while the abdominal muscles are working hard to bring the body from the leaning-back posture, assumed at the finish of the stroke, into the upright position, and carry it forward ready for the next stroke. In bringing the body to an upright position the abdominal muscles are aided by the contractions of the psoas magnus and iliacus, two muscles that come down from the inner side of the lower spine and pelvis, and are attached to the thigh bones. As the body swings forward the shoulder blades are moved apart by the serratus magnus and the arms are extended to a position of full reach, so that the hands are beyond the toes, where they are ready to dip in the oar for the commencement of another stroke. Thus it will be seen that in the act of rowing most all of the important muscles on the front and back of the body and limbs are brought into action. It is for this reason that rowing is such an admirable exercise for developing the heart and lungs. So many muscles are used that the heart and lungs are forced to work harder, in order to get rid of the increased amount of waste product and to supply the muscles with their necessary nutriment, so that the respiration, circulation and assimilation of the whole body are greatly improved.

In attempting therefore to devise an exercising machine that would give employment to all of the important muscles, something which would permit of a resemblance to the rowing movement seemed almost necessary. But rowing, critically examined, has some serious defects both from a physiological and from a mechanical point of view. While it brings many muscles into action, it requires a person to use many of them in a cramped

position, and to a great disadvantage, as in case of extreme reach of the arms forward. The whole work must eventually be done through the arms and hands, just as the work in bicycling finally comes upon the feet and legs, whatever assistance may be rendered by the rest of the body. The sliding seat enables the person to get a great reach forward at the beginning of the stroke without cramping the body quite so much, but the power communicated to the oar must be given to it through the arms, which then transmit it to the shoulders and down the back to the pelvis, from which it is transmitted through the legs to the stretcher, where the final effort, but for the oar in the water, would be to drive the boat astern. On the other hand, the effort of the feet in the toe straps to pull the seat back really tends to pull the boat forward, but the principal effort of the recovery is an effort to get the body forward so as to begin the work of the stroke. As a matter of fact two-thirds of all the muscular power used in rowing is lost, because it cannot be directly applied. This effort undoubtedly gives exercise to the muscles, but so much of the energy put forth is lost in friction and in heat that the effort if long continued becomes wearisome and exhausting.

In this new mechanical device or invention, to which the attention of the public is invited, I have endeavored to introduce a new principle into the art of propelling land or water vehicles, of using gymnasium machines for developing purposes, and of applying human power so as to realize the greatest amount of work. In devising this mechanical arrangement I have had several correlated objects in view.

1. The invention of a machine that will afford the best means of strengthening and developing the principal muscles of the body.

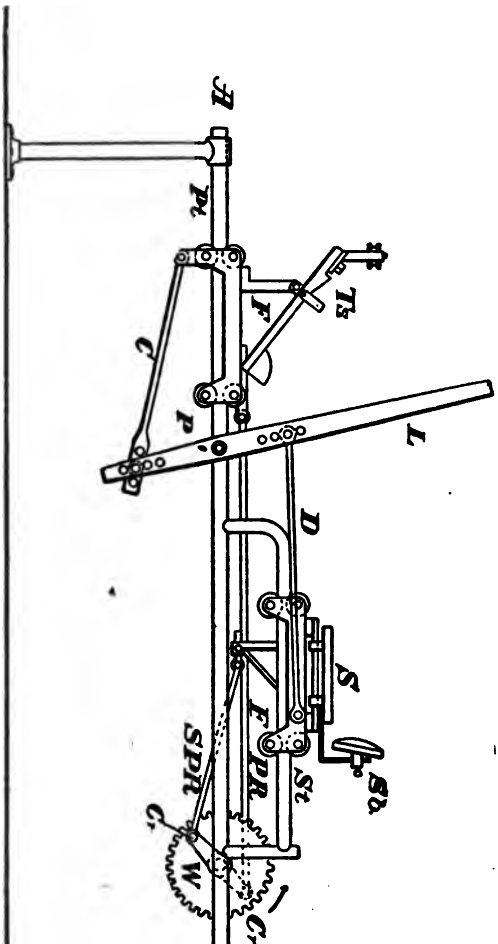
2. A machine that will permit of the use of the muscles in a perfectly natural way, each group according to its strength.

3. A machine that will bring so many muscles into action at one time as to develop the heart and lungs, without causing distress through vigorous efforts made in faulty positions.

4. A machine that will make exercise pleasurable and enjoyable through its beneficial influence on the entire system.

5. A machine so constructed that every movement of flexion and extension in trunk, legs, feet and arms adds to the propelling power.

6. A machine that will admit of one group of muscles being used while others are relaxed, or of one part of the body to rest



THE INOMOTOR.

Patented August 22, 1899.

while another part is being brought into action, or of legs, trunk and arms being used simultaneously, or of all the important muscles being used in succession.

7. A machine that could be used for the reduction of fat or obesity through general muscular activity without obliging the individual to support his own weight and thereby strain the muscles and tendons of the feet and legs before the rest of the body has had exercise enough to bring about a vigorous circulation and respiration.

8. A machine that would act especially upon the back, waist and abdominal region, which I have come to consider the weak points of many of the American people of both sexes.

9. A machine that would tend to correct the drooping head, rounded shoulders and flat chests, which characterize so many of our school children, students, literary men, and those who pursue a sedentary occupation.

10. Finally, a machine so constructed that it is almost a gymnasium in itself that can be used indoors or out-of-doors, and that can be applied to the propulsion of vehicles on the land, ice or snow; or to the propulsion of boats, by means of oars, paddle-wheels or propellors.

The mechanism which I have contrived for the accomplishment of these several objects, and which I have termed an Inomotor, may be described in its simplest aspect as a pair of levers connected by four adjustable rods with a sliding seat, and a sliding foot rest, which are each in turn connected by a power applying rod or cord to a crank clutch gear or sprocket wheel.

A more careful consideration of this mechanism will show the details upon which its efficiency as a power applying machine depends. (See Fig. 1.)

A B is a frame work composed of steel tubing. L represents a hand lever pivoted at the point P. F is the travelling foot rest which moves upon the track Pt, and S the travelling seat which moves upon the track St. W is the gear or sprocket wheel, one crank of which is connected with the foot rest by the rod F P R, and the other crank is connected with the seat frame by the rod S P R. The hand lever is connected with the foot rest by the rod C and with the seat frame by the rod D. The other important parts of the machine are the toe straps, and supports Ts, the seat back Sb, and the double rollers on the foot rest and seat frame.

The action is as follows: The person sits upon the seat S,

which is slightly hollowed like a rowing seat to fit the form, and places his feet on the foot rest, sliding the toes of his boots well up under the toe straps Ts. He then leans forward and grasps the hand levers L with his hands while the arms are extended. He is now in position to begin the stroke. As he pulls backward on the lever L he instinctively braces his feet against the foot rest for support as in rowing, but the moment the foot rest begins to feel the power exerted on the levers by the hands, it moves forward as it is connected with the levers by the rods C; the pressure of the feet therefore upon the foot rest only tends to hasten and intensify its movement forward. But as it goes forward it turns the wheel W half round through its connection with one of the cranks by the rod F P R. Simultaneously with the effort to pull the hand levers backward and brace the feet against the foot rest, the seat is carried backward by the rods D, which are connected with the hand levers, and the pressure of the pelvis against the seat back Sb, which results from the pressure of the feet against the foot rest and the extention of the legs. But when the seat S goes backward the wheel W is assisted in making a half revolution through its connection with the seat frame by the rod S P R. By this time the hand levers have been brought well back towards the seat, the legs have been fully extended and the seat and foot rest are as far apart as possible. As the body inclines back of the perpendicular the toes bend up under the toe straps, and as the foot rest feels the pull of the feet and legs it begins to return to its starting position. In so doing it is greatly assisted by the powerful impetus that may be given to it by a forward push of the handle bars. When this takes place the seat is pulled forward and the foot rest is pulled backward by the rods D and C, connecting them with the handle bars, and thus the wheel W is made to complete its revolution by the action of the rods S P R and F P R. The wheel W may be connected with other gear wheels and thus movement may be given to friction wheels, or fly wheels on stationary machines or to paddle wheels, propellors or driving wheels for general locomotion. Applying the power by a pair of levers placed in a vertical position about the width of the shoulders, or 18 inches apart, enables the person to support his body in an upright position without the constant tendency to slump or bend forward at the waist, which is so frequently experienced in rowing and bicycling.

The handle bars have a leverage of about five to one, and the

power that can be exerted by a direct drive from the legs by aid of the seat back, is more than three times as much as the legs can exert when the strain is transmitted through the back and arms, as in ordinary rowing. Moreover, more power can be applied to the vertical levers with the arms parallel, and the chest free, than with a horizontal lever, with the hands close together and the chest walls more or less cramped or restricted in their movements.

It will be observed in working the apparatus that the greater the strain put upon the handle bars by the hands, the greater will be the force exerted upon the foot rest and seat frame by the feet and legs, and consequently the greater will be the power communicated to the gear wheels. This is equally true of the backward or forward movement, and when both hands and feet are working it involves the flexion and extension of the forearms, upper arms, legs, thighs and trunk, which brings into action all of the important muscles of the body. It will also be observed that on account of the union of the foot rest and seat frame with the handle bars and gear wheel, through the agency of the connecting rods, that any movement communicated to one part is communicated to all parts. Thus the levers may be worked by the feet and legs while the arms and trunk are at rest, or the arms and trunk may keep up the work while the feet and legs are passively flexed and extended by the movement of the foot rest and seat frame. Moreover, if it is desired to use any one part of the body more than any other as a means of strengthening and developing it, this may be done by making this part do more than its usual share of work. Considering the nature and number of parts used, it will be seen that the apparatus can easily be employed as a means of special development for the biceps, triceps, shoulders, upper back, lower back, chest, abdomen and waist, gluteal muscles, front thigh, back thigh, calf and front leg, as well as a means of general development for all these muscles combined. The value of the machine as a corrective agent for physical defects and weaknesses is thus made apparent.

The machine is so constructed to admit of as little lost motion as possible. In whatever direction arms, feet, legs or trunk may be moved, the effort is converted into a mechanical advantage which is always contributing to the revolution of the gear wheels. Where it is desirable to have the active efforts followed by a certain amount of passive exercise, larger fly wheels may

be used on the gymnasium machine. The momentum acquired by the rapid revolution of these wheels will flex and extend the arms, trunk and legs for a considerable time without any active efforts, thus favoring the returning circulation of the blood and removing the cause of fatigue when it has been produced.

The gymnasium machine also may be so used as to allow the operator to oppose one set of muscles to another, and thus add to the resistance to be overcome at any part of the exercise. Thus, the action of the chest muscles, abdominals and the extensors of the forearms may be intensified by resisting the tendency of the handles to come backward when they are impelled through their connection with the seat by the powerful extensors of the legs. So the flexors of the arms, and extensors of the back may be opposed to the flexors of the feet and thighs, etc., etc. This use of the machine is of course greatly favored by the action of the heavy fly wheels or the momentum acquired by the motor vehicle.

Where great rapidity of movement is desired, followed by absolute rest, a clutch wheel is used in place of the cranks and spur wheels. If it is desirable this allows the extensors of the back and legs to work with great speed and intensity, while the flexors of the thighs, legs and abdominals and the extensors of the arms and the chest are only engaged in drawing the body forward and shooting the arms out preparatory to another stroke, as is the case in rowing. The machine may also be so used as to just reverse this process. When it is desirable to attain more resistance for the powerful extensors of the legs and back an elongated spiral spring may be used to supplement the resistance furnished by the machine. The use of the spring will greatly aid the return of the handles to the starting position, thus relieving the chest and abdominal muscles of any undue strain.

Some of the special applications of this device, with illustrations of other forms of apparatus evolved from it, will be considered later.

REPORTS FROM SOCIETIES.

BOSTON PHYSICAL EDUCATION SOCIETY.

The Boston Physical Education Society has held two meetings this fall. Both were well attended, and interesting.

At the October meeting Mr. Melvin B. Gilbert, of the Gilbert Normal School, gave a paper on Aesthetic Dancing. This presented dancing as the exercise that called for and developed the utmost control and perfect bodily development.

Miss Lucile Eaton Hill, of Wellesley College, gave an interesting account of the progress of the work in the college, and the facilities for out-door exercise.

Dr. Clarence J. Blake, former president of this society, spoke briefly on the aims of the society, and expressed his continued interest in its welfare and progress.

At the November meeting the Section of Anthropometry had charge of the programme and arranged a description and demonstration of the "Bertillon" system of criminal investigation. The measurements were shown by Mr. Barry, of the Boston Bureau of Criminal Investigation, as well as the method of filing the cards, and of tracing any person's identity.

Mr. Pettigrove, superintendent of Massachusetts Prisons, spoke of the necessity for such a system, and gave several instances of remarkable identifications of criminals by means of these measurements.

At the December meeting the annual election of officers will be held, and the section on "Public School Work" will report. This section has done considerable work, and hopes to have an interesting meeting.

MARY REES MULLINER, M.D., Secretary.

MICHIGAN PHYSICAL EDUCATION SOCIETY.

A meeting of the Michigan Physical Education Society was held at Ann Arbor, Mich., November 3rd, 1900.

In addition to the regular business a demonstration of practical work was given by Miss Helen Bender, illustrating what can be done with a class of high school girls in a small space and without apparatus. A game of basket-ball without the baskets was played, each side scoring a point, when its goal-keeper caught the ball.

Dr. Eliza M. Mosher gave a talk to mothers and teachers on "Faulty Posture in School Children," how to know by the effect upon the frame what posture is habitual, and how to correct it. She illustrated with some children from the public schools who were present.

M. P. Clough, Secretary.

NEBRASKA DISTRICT OF THE A. A. A. P. E.

A meeting of the State Society will be held at Lincoln, Neb., December 26th, when papers will be read as follows:

Influence of Physical Education on the Morals of Children, Supt. W. H. Wagner, Hebron, Neb.

Necessity for Physical Education in the Public Schools, Mr. Elmer Berry, Lincoln, Neb.

The Place of Recreative Work in Physical Culture for Children, Miss Helen Woodsmall, Omaha, Neb.

The Importance of Corrective Gymnastics for Children, Miss Anna Spurck, Lincoln, Neb.

What Hygienic Inspection of School and Pupil Might Accomplish, Dr. S. R. Towne, Omaha, Neb.

R. H. Wolcott, Secretary.

Lincoln, Neb., November 12, 1900.

NEW YORK PHYSICAL EDUCATION SOCIETY.

The regular monthly meeting of the New York Society was held at the Dr. Savage Physical Development Institute on 59th Street, New York City, October 27th, 1900. The president, Mr. J. Blake Hillyer, was in the chair, and forty-four members were present.

Dr. W. G. Anderson, of Yale University, gave a very interesting and instructive address on "The Physical Basis of Psychic Activity." An interesting discussion took place, led by the president, in which Dr. Henry Ling Taylor, Dr. Watson L. Savage, Miss Jessie H. Bancroft and others took part.

The regular monthly meeting of the New York Society was held at the Dr. Savage Institute on 59th Street, New York City, November 17th, 1900. The president, Mr. J. Blake Hillyer, presided, and there were present about fifty members and friends.

The subject for the evening, "Play as related to Physical Training," was presented in a most interesting and scientific manner by Dr. Luther Gulick, of the Pratt Institute, Brooklyn. Among those who took part in the discussion which followed were: Drs. Truslow, Savage, Crampton, Welzmiller and Taylor, Mr. Jacob Bolin, Miss J. H. Bancroft, Mr. H. Boos and others.

The following were elected to membership: Dr. Luther Gulick, Dr. C. C. Bennett, Miss Ida Sandman, Mrs. J. Connell and Miss E. M. Love.

ALEX. E. W. BARKER, Secretary-Treasurer.

SYRACUSE PHYSICAL EDUCATION SOCIETY.

The first meeting of the Syracuse Physical Education Society for the year was held at the Board of Education Rooms, November 8, 1900, at 7.30 P.M., Colonel Verbeck presiding.

A motion was made and passed that the night of meeting be changed from the second Saturday to the second Thursday of each month.

It was voted that the December meeting (for this year only) be made an annual meeting.

Mr. J. R. Scott opened the programme with a paper on "Athletics at the Paris Exposition." As Mr. Scott conducted a team from Syracuse University that made an enviable record on French soil, his address was listened to with much interest. The management of grounds, transportation to and from grounds, which could only be reached by cab; the methods of starting, etc., were all criticized as primitive and almost a failure.

The attendance was most disappointing, not more than five thousand attending during the five days, and they were principally Americans.

Every event of the first day was won by Americans, and in all-round work they easily distanced every other nation.

The difference in training was commented upon. The Englishmen continued to smoke while coaching, and after an event, were not subjected to the careful grooming that an American athlete undergoes. The English endurance was wonderful, and

they were the best looking athletes. In the manner of costumes, the Americans were superior to all others, and they were very generous in instructing the other competitors in our methods of starting and measuring.

Syracuse was one of the teams remaining firm in its determination not to take part in the Sunday games.

Miss Leveau gave a short talk on Gymnastics in the Public Schools of Sweden, and made an earnest plea for the introduction of visiting physicians and swimming schools in imitation of the more progressive Swedish methods.

The remainder of the evening was devoted to a discussion of the papers and also to a consideration of the selection of topics for the winter's work.

The next meeting was appointed for December 13, at the University Gymnasium, and Colonel Verbeck was appointed to deal with the topic, "Fencing," and also to arrange for a contest.

The meeting then adjourned.

Ada F. Thayer, Secretary.

November 25, 1900.

REPORTS OF THE COUNCIL.

October 5, 1900—Present: Drs. Sargent, Fitz, Mulliner, Baroness Posse and Mr. Eberhard.

The Corresponding Secretary reported receipts for June, $18.25; expenditures, $23. For July, receipts, $86.10; expenditures, $19.39. For August, receipts, $35.99; expenditures, $2.95. For September, receipts, $65.55; expenditures, $21.09.

The following candidates were elected to membership: Mr. Clark W. Hetherington, Columbus, Mo.; Dr. David W. Wells, Boston, Mass.; Mr. W. L. Childs, Waukesta, Wis.; Miss V. M. Holmström, Montreal, Canada; Miss May Thomas, Muncie, Ind.; Mr. Charles J. Wehr, Cleveland, O.; Miss Susan H. Gilman, Dobb's Ferry, N. Y., and Miss Adelaide R. McNamara, Boston, Mass.

The Treasurer reported: Balance on hand as per report of June 1st, $152.52; received during interval, $195.59. Paid during interval, $244.04; balance on hand, $104.07.

The President, Dr. Sargent, reported that the A. A. A. P. E. was represented at the "Turnfest" of the North American Turnerbund in Philadelphia by Baroness Posse, Dr. Grace Spiegle, Dr. Ehinger, Mr. Nissen, Dr. Sargent and Mr. Eberhard.

Voted, To refer the printing of Dr. Hastings' Résumé of Quetelet to the Committee on Publication.

After an informal discussion of the necessity of reorganizing the A. A. A. P. E., the meeting adjourned.

CHRISTIAN EBERHARD, Recording Secretary, pro tem.

November 2—Present: Drs. Sargent, Fitz, Mulliner, Baroness Posse, Miss Narey and Mr. Eberhard.

The Treasurer reported as follows: Balance on hand as per report of October 5th, $104.07; received during interval, $65.55; paid during interval, $33.09; balance on hand November 2nd, $136.53.

The following were elected to membership: Mr. Frank E. Miller, Dallas, Tex., and Mrs. Louise M. E. Blackborne, Boston, Mass.

Dr. Sargent outlined at length a scheme of reorganization of the A. A. A. P. E. It was voted to endorse Dr. Sargent's scheme of reorganization for presentation at the New York meeting of the Convention and for publication in the December number of the REVIEW.

BARONESS ROSE POSSE, Recording Secretary.

OFFICIAL ANNOUNCEMENTS.

NATIONAL CONVENTION.

The National Council of the A. A. A. P. E. hereby announces a National Convention of said Association, to be held in New York in April, 1901. In furtherance of this plan the following votes of the National Council are published:

Voted, That the New York Physical Education Society be empowered to plan and carry out the programme for the Convention, subject to the approval of the National Council.

Voted, That each member of the A. A. A. P. E. in attendance at the Convention, not belonging to any local society, shall be entitled to one vote on all matters before the Convention. Each society shall be entitled to representation by delegates. Each delegate shall represent ten members with power to vote for all of these members.

Voted, That the New York Physical Education Society shall be requested to confer concerning the Convention with a committee from the National Council, consisting of the President, the Corresponding Secretary and the Treasurer.

For the Council,

D. A. SARGENT, President.

PROVISIONAL PROGRAMME OF THE NATIONAL CONVENTION, APRIL, 1901.*

First Day.

Morning.—President's Address, Organization, Reports of Officers and Committees. Columbia University.

Afternoon.—Exhibition, Children and Youths. Columbia University.

Evening.—Address of Welcome, Exhibition of Paris Exposition work, Reception (?). Hall, Board of Education.

* A revised programme will be printed in the March number of the REVIEW.

Second Day.

Morning and Afternoon—Section Meetings.

I. Anthropometry.

II. Elementary and Normal Schools.

III. Secondary and College.

IV. Non-scholastic—Y. M. C. A., Y. W. C. A., etc.

V. Medical (or Corrective) Gymnastics. Columbia University.

Evening.—Exhibition, Adult Work. Columbia University.

Third Day.

Morning.—Reports of Important Papers, Experiments, Results, etc., from Section Meetings.

Afternoon.—Final Business Meeting.

COMMITTEE OF NINETEEN.

As finally announced, the Committee of Fifteen has become successively a Committee of Seventeen and a Committee of Nineteen.* In its last form the committee is as follows:

President William DeWitt Hyde, Bowdoin College, Brunswick, Me.

President Stanley Hall, Clark University, Worcester, Mass.

Hon. William T. Harris, Commissioner of Education, Washington, D. C.

Professor E. W. Scripture, Yale University, New Haven, Conn.

Professor John M. Tyler, Amherst College, Amherst, Mass.

Professor H. P. Bowditch, Harvard Medical School, Boston, Mass.

Professor James M. Cattell, Columbia University, New York City.

Professor Joseph Jastrow, University of Wisconsin, Madison, Wis.

Dr. Charles H. Henderson, Pratt Institute, Brooklyn, N. Y.

Dr. Edward M. Hartwell, 5 Brimmer St., Boston, Mass.

Dr. E. H. Bradford, 133 Newbury St., Boston, Mass.

Dr. L. Emmet Holt, 14 West 55th St., New York City.

Professor P. H. Hanus, Harvard University, Cambridge, Mass.

Dr. Henry Ling Taylor, 60 West 55th St., New York City.

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*These changes have been necessary for the double purpose of adding important persons to the committee and of giving it a distinctive title.

Dr. H. H. Donaldson, University of Chicago, Chicago, Ill.
Dr. Bernard Sachs, 21 East 65th St., New York City.
Dr. George J. Engelmann, 208 Beacon St., Boston, Mass.
Dr. Dudley A. Sargent, Harvard University, Cambridge, Mass.
Dr. Clarence J. Blake, Harvard Medical School, Boston, Mass.

Chairman, President William DeWitt Hyde.
Secretary, Dr. Edward M. Hartwell.
Executive Committee, Dr. Dudley A. Sargent, Dr. Clarence J. Blake, Dr. H. P. Bowditch.

SHALL OUR CONSTITUTION BE CHANGED.

DR. D. A. SARGENT, PRESIDENT.

To those who attended the last annual meeting of the A. A. A. P. E., which was held in Boston in April, 1898, it must have been painfully apparent that something was radically wrong. This was the first attempt to conduct one of our national conventions under the revised Constitution, By-Laws and Statutes, and from a business or parliamentary point of view the attempt could hardly be called a success. It was extremely unfortunate that those who were instrumental in framing the statutes were prohibited by the very wording of these same statutes from guiding the convention through the mazes of their technicalities. It is very doubtful, however, if any body of officials could have managed the affairs of the Society any differently under the existing statutes, as they were designed to meet a state of organization that has never been realized.

The Statutes, Div. A, provide that "The A. A. A. P. E. shall, until otherwise ordered by a national convention, embrace the following sections:—

1. New England.
2. New York.
3. Middle Atlantic.
4. Ohio.
5. Lake.

*** The publication of this discussion is authorized by vote of the National Council endorsing the plan outlined by Dr. Sargent.**

6. Northwestern.
7. Mississippi Valley.
8. Western.
9. Southern.
10. Pacific Coast.

It was also provided that each Section shall be divided into Districts and each District into Physical Education Societies. As set forth in the circular of announcement and appeal which was sent out by the Council in the fall of 1895 this plan of organization was borrowed from the North American Turnerbund, hoping it would prove as effective for the A. A. A. P. E. as it had for that Association. But the Turnerbund is an organization made up of nearly 400 local societies, comprising some 40,000 members. This large number of societies, at least one of which is in nearly every good-sized city, is naturally distributed into districts, sections, etc., throughout the entire country. If we compare the Turnerbund with our own organization we find we have about 600 members, six local societies in good standing, and only two Districts and one Section. The great difference in the numbers and breadth of representation in the two associations need hardly be explained. The former is an association for general culture in which education, music and politics, as well as physical training and good fellowship play a prominent part, while the A. A. A. P. E. has for its object the single purpose of the Advancement of Physical Education, as the name of the Association implies. This singleness of aim, and the confinement of membership to those who are teaching or who are interested in the cause of physical education, necessarily restrict our numbers, even though all the different interests in the subject were represented. At any rate it must be perfectly apparent that our National Association has not yet grown to a size commensurate with its present plan of organization. Moreover inasmuch as the present statutes were framed to meet the organization by districts and societies, and to have them represented at the National Convention by delegates, it literally disfranchises half the members of the National Association who are not attached to any District or Local Society. This condition of affairs was the chief source of dissatisfaction at the Boston meeting. Now, while everything should be done to encourage the establishment of local societies when possible, some way should be provided for the representation of those members

of the National Association that cannot attach themselves to any local society, because there are not enough teachers or interested persons in the community where they live to start one. Is it not possible to so organize the National Association as to increase the number of local societies, and bring the different members of the organization into closer touch with each other, and with the officers of the Association?

In the December number of the AMERICAN PHYSICAL EDUCATION REVIEW for 1897, in a brief article describing the organization of the Society of College Gymnasium Directors and the causes which led up to it, I called the attention of the Association to the tendency to disintegrate or specialize in several other directions, in order that the different members might be able to get help along those lines where they most needed it. The Boston Society of Physical Education, acting upon this suggestion, established last year several sections, each one in charge of a chairman and a secretary. These sections are on Anthropometry, Medical Gymnastics, Public School Work and Normal Schools. Any member of the Boston Society has a right to ally himself with any section he chooses, or with all if he so desires. As the Society holds its regular meetings once a month, and the Sections also, this brings one meeting of some section about every week. These section meetings are never largely attended, but those who do attend are interested in the special topics under consideration, and as each one feels free to ask questions and to "talk back," they are acknowledged to be the most helpful of any of the meetings of the A. A. A. P. E. The sections need not be confined to the subjects mentioned, but can embrace any branch of our work that has a considerable following among our members. The success of this plan of organization in Boston has emboldened me to think that some such arrangement might be effected for the National Association. Let the A. A. A. P. E. be divided into sections as it is at present, but instead of having these sections ascribed to different parts of the country where we have no members, let there be sections on Anthropometry, Medical Gymnastics, Public School Work, College Gymnastics, or such other branches of our work as the Association may choose to have thus represented.

Let there be a President, General Secretary, and Treasurer of the National Association, as at the present time. In addition to these officers let there be several Vice Presidents. Let each Vice

President be the President of one of the National Sections, and let each Section also have a Secretary. This arrangement is quite similar to that adopted by the American Association for the Advancement of Science. There could be local or branch societies as now, and each local society could have its local sections on the same subjects or departments as represented by the National Association. In communities where there were not a sufficient number of persons interested to form a local society, let them form a section, which could have its chairman and Secretary as though it were attached to a local Society.

The Secretaries of the local sections could communicate directly with the Secretaries of the National Sections, and the latter, in turn, could communicate with all the Secretaries of the local Societies, and thus a general interest in the work of the sections could be kept up throughout the country. At the National Conventions general meetings could be held for the purpose of advancing the cause with the public, and section meetings could be held in the interest of the members. Further details in arrangement need not be considered here, as many of them are already provided for in the original Constitution and By-Laws.

The adoption of this method of organization will greatly simplify our existing statutes, divide the responsibility for the management of the affairs of the Association among a larger number of persons and furnish good training for the younger members, who must be prepared to bear the burdens, and further the best interests of the Association and the cause it represents.

I would also recommend returning again to our annual meetings. It seem to me, that in holding the National meetings so far apart as once in two, three or four years, the Association has lost something of its unifying power, if not something of its interest and attractiveness to many, who valued the acquaintances made and the opportunities to exchange personal views and experiences almost as much as the more formal papers and discussions. The annual conventions might require a slight increase in dues to meet expenses, especially if the Association should still continue to expect four numbers a year of the PHYSICAL EDUCATION REVIEW.

The re-establishment of the annual meetings with frequent change of officers would also involve the necessity of electing a permanent Corresponding Secretary, in order to give continuity and stability to the affairs of the Association. It has seemed

advisable to make the above suggestions in the December number of the REVIEW, in order that the local societies and individual members may have an opportunity to thoroughly consider them and come to the next annual meeting in April prepared to accept or reject them.

CORRESPONDENCE.

THE INFLUENCE OF EXERCISE ON GROWTH.

EDITOR AMERICAN PHYSICAL EDUCATION REVIEW:

It is commonly believed that the young men and women of the well-to-do classes, both in England and America, are decidedly taller today than was the case a generation ago. This increase in stature is commonly ascribed to the popularity of out-door sports, athletics and gymnastics.

A very strong statement of the effects of gymnastics upon the youthful frame was published by Surgeon Beyer in 1896* and was extensively copied by the press. A criticism, and a reply to the criticism, have appeared in this journal.† As the issue is (to my mind) still left obscure, may I state my understanding of the case, hoping that Dr. Beyer can throw further light upon it?

The cadets entering the Freshman classes at Annapolis Naval Academy during three years, 188 in number, were measured and weighed twice, with an interval of six months between. During this interval they were placed under gymnastic regimen, beginning with setting-up drill and going on to heavy gymnastics and apparatus work.

These 188 observations were divided into five groups, according to ages. Then the observed increment for the six months was multiplied by two, in order to get a year's growth. To this procedure there are two serious objections. First, the rate of growth of normal youths is not equal during different parts of the year; and second, the impulse to growth given by gymnastic work is not proved to continue after the cessation of gymnastics. Dr. Beyer assumes that the impulse does continue, and not for six months only, but for several years after the cause has ceased to act. As far as I can judge, the assumption is purely hypothetical. If there is evidence to support it, it would be interesting to know of it.

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* See the REVIEW, September-December, 1896.
† March, 1898; September, 1900.

Dr. Beyer's argument is based upon one single observed increment in the case of each cadet. The growth during later years of these 188 Freshmen is not stated. What they gained in their second, third and fourth academic years is not told. In place of such actual data, the growth of the elder members of the Freshman class, while under gymnastic training, is taken: such growth is assumed to represent what their growth would be during the later years of academic life without gymnastics. Why so? Because, again, it is assumed that the impulse given to growth by one six-months' course continues, making them grow faster than they otherwise would have grown, for several years right along.

A similar course of reasoning applied to the weights makes it appear as if the boys who had gymnastics increased in weight on an average 25 kilograms, or 55 pounds more than their predecessors did. In other words, supposing the graduating classes ten years ago averaged 140 pounds, they now average 190! This appears to be Dr. Beyer's view. Is there any evidence from the data at Annapolis that this is the fact? Is there any considerable increase in the weight of graduating classes since the year when Freshman gymnastics were first made compulsory?

It may be believed that the increase in lung and heart power, acquired by a six-months' training in gymnastics, remains a permanent acquisition, affecting assimilation and growth favorably in years to come. Is this known to be so?

It is observed, per contra, that the first effect of any unwonted stimulus is apt far to exceed the later effects, and finally to become indifferent. Is this the case with the stimulus of exercise? Is the first increase in power much greater, month by month, than later increase? But I would rather listen to Dr. Beyer's views than attempt to put words into his mouth.

D. F. Lincoln.

Boston, Mass., November 30, 1900.

REPLY TO DR. D. F. LINCOLN.

Lest there might be continued misunderstanding I have thought it best to begin by making a few remarks with reference to the material upon which the observations upon which I base my claim were made. I wish once more to lay particular stress upon the fact that none but fourth-class cadets were under my observation, and these only during the first six months of their

fourth-class year. After that time, these cadets passed from under my control and observation in the gymnasium and, consequently, their growth during the years that followed was growth uninfluenced by the particular exercise, the influence of which I had undertaken to study, and hence this could not be and never was utilized for our purpose. This being understood, I would next ask permission to quote the following paragraph from my original article (p. 80): "The ages of the cadets entering the academy vary from 16-20 years, the average during the last four years having steadily remained at eighteen. We have then a period of growth to deal with which covers four years, namely, from sixteen to twenty years. Dividing now my 188 observations that have so far accumulated and arranging them according to age; multiplying, furthermore, by 2 these semi-annual values obtained, thus converting them into annual ones, they are ready for being compared (!) with the tables giving the normal annual absolute growth in the same dimensions and which were calculated from 4,537 cadets of previous years."

Dr. Lincoln puts this as follows: "Then the observed increment for the six months was multiplied by two in order to get a year's growth." The text of the above quotation from my article, if read aright, ought to convey the impression, that the multiplying was done, not to "get a year's growth," but in order to make the semi-annual growth-values comparable to the normal annual growth-values.

As was stated in my reply to Dr. Arnold, in the last number of the REVIEW, it neither can add to nor detract from the fact, whether the normal annual growth-values are divided by two for purposes of comparison, or whether the semi-annual ones, obtained by me, are multiplied by two to the same end, both being average-values.

The fact remains the same, that an increase in growth, due to exercise, is plainly shown. As long as these facts are as plainly stated as they are in the paper referred to, it naturally would not, and could not, occur to any one to attach a superior claim to superior numbers obtained in this manner.

This, therefore, ought to be sufficient to answer Dr. Lincoln's first two questions: (1) I have never said nor even assumed that the rate of growth is equal during different parts of the same year. (2) I have never said nor assumed, in any part of my paper, that the influence of growth given by gymnastic work was proved to

continue after the cessation of gymnastics for six months, much less for a longer period.

As Dr. Lincoln will see from my next quotation from the article under discussion, I have, on the contrary, based any deductions from the facts obtained, upon the very condition that the exercise be continued under the same principles under which it had been begun and by which I meant, as might have been inferred, that it should be attended by an ever-increasing demand upon the energy as well as ingenuity of the subjects under observation, by making the exercises very gradually both heavier and more complicated.

What I have assumed in computing the sum total of growth between 16-21 years is, that the exercise, as administered in our gymnasium to cadets differing in age, would improve their growth between any two years thereafter to the same degree as shown in my figures for the different ages, if it had been possible to make these exercises continuous during the entire period of normal growth.

It will probably be clearly understood at this stage, that I have never assumed such a result of growth could occur "without gymnastics," as Dr. Lincoln has, apparently, misunderstood me to have done.

The remaining questions asked by Dr. Lincoln will perhaps find their answers in the next quotation from my original paper; this quotation, likewise, embodies my strongest statement with regard to any claim on my part of the influence of exercise upon growth to be found in the paper: "It would appear from these figures that a positive increase in height may be attained through properly systematized gymnastic exercise, when administered between the years sixteen and twenty, amounting to 26.6 millimeters over and above that which may be expected without such exercise. (See Table 1.)" I could not, with Dr. Lincoln, call this "a very strong statement."

Finally, with reference to what Dr. Lincoln remarks on the subject of an unwonted stimulus being "apt far to exceed the later effects, and finally to become indifferent," and assuming that he includes exercise in this stimulus, I would formulate my answer as follows:—

Practice with a certain exercise teaches a man gradually to do it with the least possible expenditure of energy. An increased demand by new and heavier exercises will be answered by an in-

creased supply of strength until the maximum limit is reached. I do not think it possible that any normal living man or animal can ever become indifferent to the stimulus of exercise, any more than he can to that of heat and light.

H. G. BEYER.

EDITOR OF THE AMERICAN PHYSICAL EDUCATION REVIEW:

Dear Sir—I am afraid that I cannot follow Dr. Beyer in his method of argument. I understood at the time, and do now understand the composition of the tables. I can not admit that a table of annual growth can, without considerable error, be compared to a table of semi-annual growth multiplied by two. It does not matter in what age category an individual happens to be thrown by an imaginary dividing line in the tables, the fact remains that if he grows six months older he passes, by thus growing older, to a period of slower growth, for the fact of slower growth is brought out by all three tables of Dr. Beyer's. These three tables represent the growth of every day of life between the ages of 16 and 21. They show that on the average every day added to age diminishes the daily growth. If, then, individuals of varying age, within certain limits, are measured at the beginning of a year, a second time after six months, and again at the end of the year, each individual should, on the average, have grown less in the second six months. Whether I should place all the individuals into one table and average their semi-annual growth, or whether I should group them into any number of convenient tables, will make no difference; the whole table, as well as the group ones, will show less average growth for the second six months. If I should multiply the result of the first six months for each individual, or the whole table, as well as the group tables, by two, I should certainly get a larger figure than if I added the result of the first and second six months. This difference would show on the individual, the whole, and the group table as well.

This difference is the error in Dr. Beyer's tables. This error is accentuated by the fact that the semi-annual table shows the effect of a stimulation extending over a period of six months. The effect of this stimulus is multiplied by two. It does not represent the effect of one year's stimulation, because in the second six months each individual would be less favorably influenced, if for no other reason than that he is six months older.

"This is in perfect accord with the laws of growth, for it is well known that the younger a person the greater also are his chances for growth, and it would seem a most natural inference to make, that any agent influencing growth favorably would likewise have its best chance to assert itself at that time." (Dr. Beyer.)

At some other time I shall take occasion to look at the vital index and its bad behavior, in Dr. Beyer's tables, a little closer. Meanwhile, and while we are about to suggest highly useful and interesting occupations to one another, might I suggest to Dr. Beyer, in the first place, experiments with two sets of figures according to the lines above indicated? Finally as only experimental results are entitled to consideration (?), can Dr. Beyer not give the figures for later measurements of any of the 188 individuals that were included in the table? From a passage on page 79 (Vol. I, Nos. 1 and 2, AMERICAN PHYSICAL EDUCATION REVIEW), I take it, that the cadets were measured in September of each year. The question at issue would then be decided by actual facts.

E. H. ARNOLD.

October, 1900.

REPLY TO DR. ARNOLD.

Dr. Arnold "cannot admit that a table of annual growth can, without considerable error, be compared to a table of semi-annual growth multiplied by two."

No one, least of all myself, could disagree with him in this respect, if we were dealing with individual instead of average growth increments, as in the case under present discussion. Both the annual growth values as well as the semi-annual growth values have been derived according to the same method, namely, the generalizing method, in order to make these comparable one with another. If Dr. Arnold will take the trouble to realize this thoroughly, he will experience no further trouble in following my argumentation.

In both cases the ages were calculated from the nearest birthday. Taking, as an example, age seventeen, we would have included in that age as many of an age within five months below seventeen as there are within the five months above seventeen. During a period of observation of six months of the same lot of

boys, therefore, as many would pass on to the next year's average as would come in at the lower end to form the seventeen year average. Hence, it will be seen that whatever is gained in one way is lost again in another, and the result can never be anything else but an average value. What the distribution of the component parts of this average value among the different months of a year is can never be found out with this method. The individualizing method alone can give us the required information.

Both my gymnasium averages and the normal growth averages must, therefore, be treated alike, and we cannot treat one as an individual and the other from the point of view of a general average and then compare them with each other. Whatever, therefore, is true for the normal growth values, is likewise true for those that were obtained under exercise.

The stimulus which alone produced the observed increase is only one-half of that value which it should be in order to make the comparison absolutely correct. I have multiplied this semi-annual value in order to make it comparable with the annual value, and because, dealing as we do with average values, it is probably correct. But, as I explained in my last reply, if any one with conscientious scruples should happen to be better satisfied by dividing the normal growth values by two, and then make the comparison, I should not at all object. The fact itself, namely, that exercise influences growth favorably being proved by figures, would remain established either way, and that is all I ever have claimed for myself.

So far as his suggestions are concerned, I am sorry not to find myself in the fortunate position to follow them, although, as will be seen, the fault is not entirely on my side.

In the first place, having left the Naval Academy nearly five years ago, I have no longer free and convenient access to the records of these cadets, and even if I had they could not be utilized for our purpose because proving nothing.

If I understand his second suggestion, what Dr. Arnold wishes me to do is, in brief, as follows: Engage about two hundred boys, exactly sixteen years of age, say at a salary of $1,000 a year for each. Let one hundred of these boys grow as they please; put the other hundred under the influence of exercise for a period of five years, or until they have attained their twenty-first year. Note the result of growth in both lots of boys and compare. Total cost of the experiment, a round million. The

result may perhaps come out different from the one I have indicated, and furnished free, but I doubt it. Nevertheless, this suggestion I am willing to take, providing Dr. Arnold will be good enough to furnish the funds.

H. G. Beyer.

[The essential point of controversy between Dr. Beyer and his critics seems to have escaped attention in the correspondence printed in the present number of the Review. The work of Malling-Hansen and others has proved that the six months' growth, in weight at least, from the end of September to the end of March is much greater than half of a full year's growth. As Malling-Hansen points out, this period includes portions of the periods of rapid and slow growth and avoids, in addition to a portion of the period of slow growth, the period of actual loss in the late spring. This view has been further substantiated by certain anthropometric studies, as yet unpublished, in which it has been found that the growth in weight of a number of boys from the end of September to the end of March amounted to about five pounds, as compared with one to two pounds from the end of March to the end of September. It would thus be a source of error to figure the yearly growth in weight as twice that of the first period and there would therefore be no foundation for the claim that exercise increased the growth of this period unless it could be shown that the growth under exercise was out of proportion to the normal growth for the same ages during this six months' period. It is not impossible that some one can furnish the missing unstimulated growth increment in both height and weight for comparison with Dr. Beyer's figures. Otherwise we seem to be left sadly in need of exact data of the influence of exercise upon growth.—Ed.]

SWEDISH PHYSIOLOGY.

Editor of the American Physical Education Review:

In your review of Massage and The Original Swedish Movements, by Kurre Ostrom, contained in the March number of the Physical Education Review, after quoting this note on the aim of rotation (circumduction)—

"The aim of the rotation is to lengthen and shorten the veins so as to produce a sucking of their contents, thus stimulating the circulation and assisting the heart in its action," you say, "that

this sort of physiology still remains in the literature of Swedish gymnastics is difficult of explanation." The late Professor Sven L. Lovén, of Stockholm, stated:

(Var Tids Forskinng No. 17*) that "at the greater number of the articulations, but especially around the hip and shoulder-joints, as well as at the lower part of the neck, the superficial part of the walls of the veins is usually fastened on aponeuroses and fasciæ, which by certain movements are extended so that the veins are expanded. This causes in these veins a suction which powerfully accelerates the return current. By the alternate motions of the joints the veins may thus be alternately extended and contracted, filled with blood and again emptied. This is true not only of the extremities, but also and especially of the largest of all the veins, the inferior vena cava, which is so located along the front of the spine that it must follow the movements of the latter. If the thorax be bent forward, this vein becomes highly contracted, again to expand when the trunk is straightened. Experiments have proved that the capacity of the vessel largely increases at such extension. It is easy to understand how at every extension, and still more at backward flexion of the trunk, a suction is caused in all those veins which supply the inferior vena cava, especially in those of the lower extremities. A similar condition takes place in the veins of the arms when these are extended sideways and somewhat backward, with the hands closed. Finally, as regards the jugular veins, these are the most extended when the head is bent backward with upturned face."

This statement was based upon the result of a great number of experiments made on living vessels. Professor Lovén was a prominent scientist of the age, making zoology and physiology his specialties. His rank among his contemporaries may be judged from the fact that he defeated Darwin for membership in the French Institute in 1872, and in 1892 he was chosen over Huxley for the Prussian Order of Merit.

With such a man as authority, it would seem that the theory upon which the movement of circumduction is based, borne out as it is by fact, might well be accepted by Americans as well as Swedes.

BARONESS ROSE POSSE.

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* Larobok i Sjukgymnastik by T. J. Hartelius, M.D., Stockholm, 1888.

REPLY TO BARONESS POSSE.

In Baroness Posse's statement we find the basis for the Swedish confidence in the efficacy of flexion movements in assisting blood flow in veins. As I have been unable to find in modern physiological literature any reference to the experiments performed by Professor Sven L. Lovén, I am unable to discuss his work. The fact, however, that modern physiologies make no reference to his experiments and do not credit such movements with any helpful influence on the circulation must make one skeptical as to its value. Again, the flow of blood in the larger veins is comparatively rapid, nearly half as fast as in the arteries (it is in proportion to the area of cross section of arteries and veins of the various limbs since practically all of the blood which goes out from the body through the arteries must return through the veins). It is difficult to suppose that flexion or circumduction movements would have any influence upon the rapidity of this rapid flow, since even if it is granted that the blood vessels are held open by connective tissue attachments to surrounding parts, the change in capacity of the vessel is but a small fraction of the volume of blood which passes through it during the movement.

Again, the clinical corroboration often quoted in support of the theory is inconclusive for the reason that it is impossible to rule out the influence which these movements have upon the flow of lymph. Investigation has shown that this influence is so great as to double or even treble the lymph flow. Furthermore, our present knowledge of the physiology of tissue cells warrants the assumption that this change in the lymph flow is far more important than any slight change in blood flow.

The claim that backward flexions suck the blood out of the spinal cord and thus serve to relieve the congestion of the spine must, therefore, be considered rather fanciful than real, as well as the reduction of cardiac activity, by slow leg movements.

G. W. Fitz.

EDITORIAL NOTE AND COMMENT.

Most members of the A. A. A. P. E., especially those who attended the first National Convention of 1899 in Boston, will welcome Dr. Sargent's plan, since it promises much for the formation of successful local societies through the development of interest in sectional work. The National Council will naturally be the centre of this activity, and through the mediumship of the REVIEW, the topics for discussion will be transmitted to all members, and thus rendered uniform throughout the Association. The weaker societies will thereby be relieved of the burden of formulating their programmes and to a certain extent their discussions, especially if the central committee furnishes detailed topics and references. Students of physical training will also be able to use these section programmes as topical suggestions for reading.

The proposition for an increase in dues suggested by Dr. Sargent should meet the hearty approval of every member of the A. A. A. P. E., for the reason that the present fee of one dollar a year does not pay for what the members receive. Aside from the benefits derived by membership in a large, representative, professional organization, the members receive the REVIEW, which is worth several times the total fee. A journal of this character must necessarily be limited in circulation, and at the present subscription price it cannot be edited and printed unless most of the work is done gratuitously. As is well known, journals of the REVIEW's professional and scientific character cost from three to five dollars per year. During the formative stage of the REVIEW those who gave their time and labor freely were recompensed by the fact that they were contributing to a growing cause, which must be proved a success before it could demand support. That stage has been successfully passed, and the REVIEW now deserves to be placed in such a position financially that among other things the the individual who contributes the paper, as has been almost universally the case in the past, and the translations required for an adequate knowledge of the work in foreign lands recompensed.

It is believed, therefore, that the members will cheerfully respond to this increase of dues, which will so materially contribute to the dignity and to the welfare of their Association and REVIEW.

This number of the REVIEW marks the end of its fifth year. During its short life it has contributed much to the Association to which it owes existence. Unquestionably during the years, from 1895 to 1899, during which there were no meetings of the A.A.A.P.E., the REVIEW was instrumental in holding the Association together, as is shown by the marked increase in membership during this period. As the REVIEW goes to the most distant membership which were notoriously unequal under the old system of yearly meetings, to which only a few could afford to go because of distance. The REVIEW has grown during this period in size* and, we trust, in value. Eight hundred copies of each number of the REVIEW were formerly printed, of which five hundred were sent to regular subscribers. This number has been increased to a thousand, and in the near future will have to be increased again to eleven or twelve hundred. With each issue of the REVIEW, more than eight hundred copies are sent out, over seven hundred of which go to members of the A. A. A. P. E. and the remainder, through paid subscriptions, to public, university and normal school libraries. Many join the Association to obtain the REVIEW, and the constant inquiries in regard to it are indicative of the position which it has won. The friends of the REVIEW thus feel that it has justified itself beyond all possible anticipation.

The Convention of the A. A. A. P. E. under the present Constitution consists of representatives of its members having the power to legislate in their behalf upon questions affecting the policy of the Association. Its existence is ephemeral, being limited to the period of actual meeting, and its officers are of its own creation. The body, as a whole, is supposed to partake of the nature of federal or state legislatures. The fact that at the last Convention many members of the Association attended who were not represented by delegates, and had therefore no right to an expression by vote, has led the Council to adopt by formal

* Vol. I.—96 pp.; II, 262 pp.; III, 323 pp.; IV, 396 pp.; V, 375 pp.

vote a modification of the Constitution, which it is thought will meet with the approval of all members of the Association. In accordance with this modification, (1) individual members, not represented by a delegate, are entitled to vote upon all questions before the Convention; and (2) societies may send one delegate for each ten members, said delegate to have the power of casting ten votes and no more. It will be seen that in order to have full voting strength societies must send the full number of delegates to which they are entitled; that, further, the local society is prevented from overwhelming the Convention with its members if they so desire, while the distant society benefits by the vote of every member present. In view of these advantages, the Council believes itself to be justified in assuming the right temporarily to amend a constitution which has been found to be cumbersome and unjust.

Attendance at the Convention.—The meetings of the A. A. A. P. E. have been so infrequent during the last six years that it is to be hoped that members at a distance from New York will find it feasible to attend the coming Convention. Nothing can be more stimulating than the opportunity to meet and exchange ideas with other progressive teachers. Furthermore, New York is the centre of so many phases of educational activity that the possibility of visiting under the most favorable circumstances, its playgrounds, gymnasia, vacation school plants, etc., etc., would seem to be in itself sufficient incentive to attendance.

NEWS NOTES.

The Department of Superintendence of the National Education Association holds its next meeting February 26, 27 and 28, at University Hall, Fine Arts Building, 203-207 Michigan Boulevard, Chicago, Ill. President Hadley, of Yale University, is to give an evening lecture. One session of the meeting is to be devoted to reports of the work in domestic economy and manual training in elementary schools, and one afternoon to round table discussions. It is also desired to have reports of interesting educational experiments in various parts of the country. The names of speakers are not yet announced.

"The vacation schools and playgrounds of New York City were opened July 9, 1900, to swarms of would-be pupils. More than 5,000 children have been enrolled and hundreds turned away for lack of accommodation.

"This year the schools include five out-door gymnasia, thirty-one school playgrounds, seven roof gardens, ten swimming baths, six recreation piers, five kindergarten tents, three Central Park playgrounds, and six places for evening libraries and quiet games.

"In the school-rooms industrial branches are the main feature of the general instruction. Boys and girls are taught what will be of direct practical use to them in later years. The boys have classes in toy making, joinery, bent-iron work, cane modeling, and whittling. The girls are instructed in cooking, nursing, doll-making, millinery, designing, knitting, crocheting, domestic economy, dressmaking, embroidery, paper flower making, and sewing.

"Perhaps the most picturesque classes are those in which the little girls learn to be cooks and housewives. In cooking, simple every-day dishes are taught. One interesting feature is the nursing lessons, which include care of the patient, cooking for the sick, treatment of burns, scalds, open wounds, etc. In some cases real paraphernalia are furnished. Infants, who are brought

to school by their mothers, submit to being bathed, and properly rubbed and swathed afterward. It is said that there is great rivalry among mothers for getting their infants into school early.

"The joys of the playgrounds are many. Each has its kindergarten with sand pile, piano and toys, its gymnasium, baths, basket-ball court, swings, see-saws, general games, and libraries. Experienced teachers, gymnasts, and swimming instructors have been chosen to direct all classes.

"Excursions form an important feature of the whole work. While every effort is made to render them enjoyable, they will also be as instructive as possible. Classes in sketching go to Central Park or other places, where children may get a bit of the country. There, though they work, they have a regular picnic, for they take along a lunch and spend the day. The nature class, too, has country outings.

"The teachers in the vacation schools are almost all young women who have just come out of normal schools, though in the special classes older and more experienced teachers are required. Very few, however, are of the regular staff."

(The School Journal, N. Y., July 28, 1900.)

Twenty-eight summer playgrounds and five vacation schools were opened this summer in Philadelphia. The playgrounds were in charge of Miss Elizabeth O'Neil, who introduced last year many valuable features. Games, toys, and sand-piles formed the chief amusements for the little ones. Instruction was given in elementary manual training, such as basket weaving, card cutting, scrap book making, and sewing. Benches were provided for the mothers who might visit the grounds to watch their children at play or take their babies there for an airing.

In the vacation schools instruction was given in sloyd, zoology, botany, Florentine iron work, sewing and fancy needle work, paper folding, and nature study. Out-of-door departments were organized, and excursions taken almost every day.

For the first time in the history of vacation schools in Buffalo the city has borne their expense for a term of four weeks. The teachers volunteered their services.

A brakeman on the Erie Railroad fell from his train and had his leg cut off by the car wheels. He constructed a tourniquet

with his handkerchief and knife and stopped the hemorrhage. He then built a fire to warm himself and signaled the next train, by which he was taken to a hospital.

The Philadelphia Medical Journal quotes this instance as an example of the value of instruction in first aid to the injured, and urges that all upper-grade school children should be taught so much of applied physiology as will enable them to act sensibly in case of accident to themselves or their fellows.

By a study of the death statistics in the State Hospital for the Insane at Poughkeepsie for ten years, Dr. Pilgrim, its superintendent, has determined that the largest number (20 per cent) of deaths occur between three and six P.M., the next larger between six and eight A.M., and the least number in any one hour between four and five A.M.

This accords with Dr. Lombard's investigation regarding the diurnal variation of strength, in which he found that the strength was least at four o'clock A.M. and four o'clock P.M., and greatest at ten o'clock A.M. and ten o'clock P.M. It has further been noted that suicides occur at these same periods of least strength.

Experiments are being made in the American army in Texas in which concentrated rations with chocolate and meat extracts are employed. It is claimed that they have the merit of the ordinary bulky rations without the disadvantage of their weight and may be used either dry or in solution.

In this line the English and Germans have also been conducting experiments. They now regard chocolate as a valuable auxiliary food on account of its light weight and sustaining power, as well as confectionery of all kinds which, because of its sugar contents, has been demonstrated to be of large value in severe exercise.

Swedish Gymnastics in Berlin.—Forty-eight Swedish gymnasts on their homeward journey from the Olympic Games in Paris, were given a reception by the Berlin gymnastic societies. They were given opportunity to show their method of exercising. In one of the large military drill halls, where an immense and critical audience had gathered to see their visiting gymnasts, this unique exhibition was held. Among the spectators were several royalties and numerous friends of physical training and sport.

Under the command of Lieutenant von Friesendorf these 48 Swedes gave a remarkable exhibition. The greatest stress was laid upon free exercises, and the largest part of the programme consisted of this sort of exercise. It must be acknowledged that these movements were well arranged and especially well adapted to bring about a uniform muscular development. Particularly striking were the resistive and balance movements, in which the Swedes showed a remarkable skill and grace. Hand-balancing and hand-springs also were introduced in these free exercises, and the German spectators were amazed when, suddenly, all of these 48 gymnastics turned hand-springs, and again, when they, in groups of 23, stood on their heads. Finally the Swedes gave an exhibition of strength upon the boom, and one-arm pull-ups on the slanting rope. The only apparatus work they performed was upon the Swedish horse. After the German "Turners" had, in return, given an exhibition of their work, Premier Lieutenant Balk, with a few well-chosen words, thanked them for the kind hospitality which had been shown them, and expressed the wish that the good fellowship might continue through the future. (Mind and Body.)

The Educational Council of Amsterdam has issued a very timely order, according to which the wearing of corsets by school girls is to be forbidden. (Mind and Body.)

The relative importance of the various forms of athletics in colleges is illustrated by the following tables of receipts and expenditures at Harvard during the year 1899-1900:*

	Receipts.	Expenditures.
Foot-ball	$60,604.41	$18,335.83
Base-ball	13,942.37	10,492.02
Track team	1,865.74	2,675.61
University Boat Club..............	5,448.54	5,672.51
Weld Boat Club...................	861.67	1,754.75
Newell Boat Club.................	1,209.74	1,374.71
Freshman foot-ball	3,316.45	2,541.25

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* From report of S. L. Fuller, graduate manager of the Harvard Athletic Association, Harvard Graduates' Magazine, December, 1900.

Freshman base-ball	1,845.65	1,504.06
Freshman crew	2,606.50	2,238.05
College nine	141.90	279.69
Skating rink	73.00	76.78
Cricket Club	26.50	141.10
Lacrosse Club	527.60	687.07
Lawn tennis	1,280.85	874.36
General account	3,722.89	4,439.37
Buildings and grounds account		4,441.55
Permanent improvements	46,265.69	20,710.20
Totals	$104,739.50	$78,238.91

In the summary of expenditures some of the items are:

Boats and oars	$2,246.85
Doctors and rubbing	2,447.45
Salaries	2,100.00
Supplies	6,865.89
Trainer and coaches	2,932.73
Training tables	4,966.40
Travel	8,482.95

SUMMARY OF EXPENSE.

Cost of management	$4,439.37
Care of grounds and buildings	4,441.55
Cost of running teams	39,078.65
Total expense of teams	$47,959.57
Amounts paid other teams	$9,569.14
Amounts expended on permanent improvements	20,710.20
Total expense for year 1899-1900	$78,238.91

The following announcement, which serves to illustrate the demands which are being made for preparation of teachers of physical training by school superintendents, is of sufficient interest for reprinting:

Department of Education.
The City of New York.
Examination for Teachers of Physical Training.

Office of the City Superintendent of Schools,
Park Avenue and 59th Street.
New York, October 24th, 1900.

A written examination of applicants for licenses as teachers of physical training in any or all of the Boroughs of the City of New York will be conducted by the Board of Examiners on Friday, March 1, 1901, commencing at 9.30 A.M., at the Hall of the Board of Education, Park Avenue and 59th Street, Manhattan; and an oral examination, at the call of the Board of Examiners.

A. Each applicant must be at least 18 years of age and of good moral character.

B. Each applicant must be a graduate of a high school or an institution of equal or higher rank, or must have an education that is equivalent.

C. Each applicant must be a graduate from a professional course of at least one year, in the teaching of physical training.

D. Each applicant must have had at least one year's successful experience in teaching physical training.

E. Each applicant must pass a written and an oral examination. The written examination will be upon

(a) Anatomy, physiology and hygiene;
(b) Systems of physical education;
(c) Gymnastic games;
(d) The principles and the practice of physical training, including methods of instruction and class management;
(e) Elementary principles of voice-building.

The oral examination may include a practical test with a class in physical training.

In the written and oral answers to examination questions, the applicant must show ability to use the English language correctly.

A supplementary academic examination will be required of all candidates, whatever their academic history, who, in the judgment of the Board of Examiners, should undergo such a test. Applicants who are not graduates of high schools or other institutions of equal or higher rank may be required to prove their academic qualifications by passing such an examination.

All documents submitted as evidence of scholarship, training or experience must be originals and must be accompanied by duplicate copies. These should be submitted on the day of the examination.

Each applicant who enters the examination will be required to report for physical examination to one of the physicians authorized by the Board of Education, within ten days after the date of the examination. The fee, three dollars, is to be paid by the applicant, to whom it will be repaid after his acceptance of appointment. No person will be licensed who has not been vaccinated within eight years, unless the examining physician recommends otherwise.

The licenses issued under these regulations hold for the period of one year, and may be renewed for two successive years, without examination, in case the work of the holder is satisfactory to the Borough Superintendent. At the close of the third year of continuous successful service, the City Superintendent may make the license permanent.

WILLAM H. MAXWELL,
City Superintendent of Schools.

QUESTIONS IN THE SCIENCE OF EDUCATION FOR LICENSE TO TEACH PHYSICAL TRAINING IN HIGH SCHOOL, MAY, 1900.

Answer five questions.

1. Answer (a) or (b).

(a) Briefly indicate the meaning of the terms, liberal culture, wisdom, information, education, training, formal discipline, secondary school. (b) It has been held that in an ideal course of education, a young man would pass successively through three stages: 1, disciplinary; 2, liberalizing; 3, professional or technical. 1, to be passed in elementary or secondary school; 2, in college; 3, in professional school.

Critically examine this view, showing to what extent, if any, it has been followed in practice.

2. Name two principles underlying the formation of habits. Illustrate the application of each of these principles in the teaching of your specialty.

3. Mention, with reasons, three specific values of the study of your specialty.

4. Choose any period in the history of civilization, or in the development of a nation. Describe its educational activities and interests and give a brief account of its educational literature.

5. "American teaching in school and college has been chiefly driving and judging; it ought to be leading and inspiring."—President Eliot. Give, with reasons, your opinion as to the truth of these two statements, illustrating each kind of teaching. Show how teaching can be made to conform to this ideal.

6. "I am convinced that the education of the ear is too much neglected in modern schools."—F. A. Walker.

Discuss this statement, illustrating its meaning and showing how the ear may be educated in the study of your specialty.

7. Describe in detail how a teacher of your specialty can coöperate with the department of English.

[These questions suggest the trend of the demand upon physical training teachers to be not merely exponents of a system of movements which they can give on the floor of the gymnasium, but rather of a physical training or education of the individual which shall be an integral part of his organic training in the school. This change must be welcomed by all, but especially by the normal schools, who can recognize in this the growing appreciation of their efforts to give a broad preparation to their pupils. New York's example will doubtless be followed rapidly by others, and will make it necessary in the near future for teachers of physical training to have a broad foundation in general educational theory and the history of education, besides a good training in both the theory and the practice of their specialty. Another hopeful aspect is the increased dignity the position of the physical trainer thus receives, together with the increased salary, which must go with the better training and higher quality of teacher.—Ed.]

ABSTRACTS.

Corset Pressure on the Thorax.—Thiersch has made a series of experiments in order to determine the amount of pressure that the corset, as ordinarily worn, exerts upon the thorax. He first estimated the amount of pressure caused by the respiratory movements at the waist, above the lower border of the ribs, and over the breast, by placing a firm strap about these, to which a

dynamometer was attached. He instructed the patient to take deep and shallow breaths. With an initial pressure of 1,700 grams, he found that shallow breathing gave rise to a pressure of 2,400, and deep breathing to a pressure of 3,500 grams. When the strap was placed around the thorax the figures increased enormously, reaching 6,100 grams per deep inspiration at the upper level. The second series of experiments was made with six varieties of corsets that he obtained from a dealer. These were suspended vertically and the amount of distention produced by various weights carefully measured. There was considerable difference, some extending readily to light weights, but soon reaching the maximum; others only extending after considerable weights had been employed, and still others being relatively stiff. It was found further that the flexibility of the corset corresponded inversely with the amount of pressure exerted. By insertion of a dynamometer between the corset and the body of the subject, it was found that with a moderate tension, 300 grams, a pressure of 700 grams during deep inspiration could be obtained. Thiersch believes that the pressure of the skirts at the waist is far more serious than even the pressure of the corset, but he admits that women have accustomed themselves to the pressure of both, and can even lead a fairly active existence, although constantly subjected to a pressure of 1.5 to 2 kilograms around the waist. Nevertheless, permanent injury is frequently produced upon the thorax and abdomen, and therefore reform in costume is urgently required.—Abstract in the Philadelphia Medical Journal, October 6, 1900.)

Diameter of Muscles.—Hauck has investigated the transverse diameter of various muscles, most of them being removed during rigor mortis. In a new-born child it was found that they were practically all of the same size. As life progressed, the size of the muscle-fibers varied very greatly in different muscles, thus in the gemellus, it was at birth 7.1 mu; at the age of 2 3-4 years 18 mu, and in adult life, 61.3 mu. In other muscles similar changes could be observed. The size of the muscle-fibers also depends to a certain extent upon the condition of the nutrition of the individual. In a very muscular man, the average in one particular muscle was 70.2 mu, while in an old man of 78, senile and marasmic, the fibers of the same muscle were 29.7 mu. The

period after death also seemed to have considerable influence. Several cases were tested and it was found that the fibers before rigor mortis were larger than during rigor mortis, and that after it was diminished they gradually increased in size again. Moreover, the hardening fluid seemed to have considerable influence, causing a variation of from 33.6 mu to 71.6 mu, in the average diameter of the fibers in the same muscle. In fragments taken from different portions of the same muscle, the average diameter of the fibers was practically the same. Seven dogs were also used for experimental purposes. In one the right gastrocnemius was excised, in the second the sciatic nerve cut, in the third the right leg fastened in a plaster bandage, the fourth was placed in a small cage, the fifth suffered hemisection through the dorsal spinal cord, the sixth animal was encouraged to live an active life, and in the seventh the knee and ankle-joints were destroyed by injections. In the first animal the muscle-fibers of the gastrocnemius were found to average 6.7 mu, in the second comparison of the two sides showed a considerable diminution in the average size of the fibers in the affected muscles. In the seventh dog in which experimental ankylosis was produced there was again some atrophy in the fibers of the muscle. In the animal that had been kept in a case it was noticed that the transverse striations were more pronounced than the longitudinal.—(Abstract in the Philadelphia Medical Journal, October 6, 1900.)

The Immunities and Proclivities of the Arab Races.—At a recent meeting of the Société de Biologie in Paris, M. Remlinger called attention to the immunity of the Arab to typhoid fever and other diseases of the digestive tract, and his susceptibility in regard to pneumonia, phthisis, and other affections of the respiratory organs. He attributed these peculiarities to the fact that the Arabs were accustomed from infancy to drink contaminated water, and that they had thereby undergone a kind of immunization relative to enteric fever and kindred diseases. On the other hand, from always breathing the pure air of the deserts their lungs were particularly liable to suffer from atmospheric impurities.—(British Medical Journal.)

Notes on Massage in Japan.—As every one knows, massage has been largely practised in Japan almost from

time immemorial. In a recent tour through that country one of the most interesting and curious sights that I witnessed was a little "tot" between five and seven years old, with the utmost seriousness and earnestness, and with a marked degree of skill, standing and massaging the age-stiffened trapezius and other muscles of the shoulders of an old grandfather or grandmother squatting before him. The common belief that the blind have in Japan a monopoly of the practice of massage appears to be only so far correct that probably 90 per cent of the practitioners of the art are blind persons, who wander about the street, blowing a peculiar double whistle, whose two weird notes may be heard at almost any hour of the day or night, pleading for work and sustenance.

In order to make out the difference between the art as practised by the Japanese and the Europeans, I ordered a masseur in Yokohama, Tokyo, Kioto, Mianoshita, Nikko, and one or two other places. As was perchance naturally to be expected, Yokohama being simply a foreign excrescence on the Japanese body corporate, the masseur in that city was not blind and seemed simply to be badly trained in the European methods. I could not make out any difference between him and a second-class American masseur.

Kioto is the centre of all that pertains to Japanese religion, art or customs, having been the capital of old Japan, and being still the culture-capital of the country. The masseur I saw there possessed great skill; his methods, however, did not differ very greatly from those to which we are accustomed except in one motion, which seems to me the most efficient I had ever had practised on me, for the purpose of deep kneading between groups of muscles or of muscles situated much below the surface. The motions were so quick that in the absence of ability to talk with the practitioner it was a little difficult to perceive exactly how they were made, but I finally made out that the procedure might be termed a rolling use of the different joints of the fingers; first, the tip; then the distal intraphalangeal articulation; then the next joint; and then the knuckles applied one after another with great rapidity and force; the maximum of the force sometimes being reached with the second intraphalangeal joint, the knuckles only pressing lightly; in other cases the knuckles themselves giving the main blow. It was apparently when it was desired to penetrate deeply between two closely placed muscle-groups that the

maximum force was applied with the second intraphalangeal joint.

One or two somewhat curious differences between the Japanese customs and our own were noticeable. In one of the places a woman, old, blind and ugly, was sent to do the work. The length of the seances seemed to be arranged according to the desire or the ability of the person operated upon to pay, and were remarkably cheap even when the foreign price was demanded. Thus, asking the charge at one of the hotels, before engaging an operator, I was told "Thirty sen," i. e., fifteen cents an hour. On expressing surprise, saying I had always paid forty sen, the man replied, "Oh, yes, that is the price for the foreigner." Not considering myself seriously cheated I paid the forty sen, or twenty cents an hour, of labor sufficiently hard to make the operator sweat freely. H. C. Wood, M.D., in the Philadelphia Medical Journal, November 10, 1900.)

Hygienic vs. Open-Air Treatment.—Burton-Fanning advocates the term hygienic treatment instead of open-air treatment. The chief feature of open air is its comparative freedom from micro-organisms, but allowance should probably be made also for the presence of ozone. The view is held by many that some peculiar property belongs to air in motion. Generally speaking, the effects upon a consumptive patient of life in the open air are increased sense of well-being, increased appetite and assimilation, resulting in gain of weight and physical development, reduced frequency and increased strength of the pulse, improvement of nerve-tone, encouragement of healthy sleep, improvement in the quality of the blood, increased activity of the lungs, and comparative immunity from respiratory catarrh. Among other diseases that respond to open-air therapy are the other tuberculoses, typhoid fever, small-pox, scarlet fever, measles, whooping-cough, certain nervous diseases, such as neurasthenia, anemia, rickets, marasmus, and diarrhœa. Chowry-Mutu said that certain cases of pulmonary tuberculosis are not suitable to be subjected to open-air treatment. These include: 1. The chronic cases that have run a mild course, and in which the system has been vitiated by the toxin of the tubercle bacilli and other pathogenic organisms. 2. The cases in which the stomach is feeble with a tendency to nausea and vomiting, and in which the stomach trouble

is much more serious than the lesion of the lung. 3. The cases associated with bronchial catarrh.—(Abstracted in the Philadelphia Medical Journal, November 10, 1900.)

Symmetrical Development.—At the annual meeting of the Americal Medical Association, the Section on Diseases of Children, June 5 and 8, 1900, Atlantic City, N. J., Dr. E. Stuver, of Fort Collins, Colo., read a paper entitled: "Symmetrical Development; or, Does Our Present School System Develop the Highest Powers of the Child?" He emphasized the principle that physical, intellectual and moral powers should be developed simultaneously and symmetrically. The instruction must be adapted to the ever-varying needs of the growing child. Educational standard among teachers must be raised, and they must receive better pay. More original work and less routine in teaching is needed. Too many studies should not be pursued at the same time, but a stronger grasp of the fundamental principles must be secured. The study of nature in the open air should be substituted for dry text-books. All harsh and dangerous punishments should be banished as unhygienic.—From Pediatrics, October 15th, 1900.

BOOK NOTICES AND BIBLIOGRAPHY.

Educational Aims and Educational Values. Paul H. Hanus, Assistant Professor of the History and Art of Teaching, Harvard University. New York, The Macmillan Co., 1899. Pp. vii, 211. $1.00.

Eight addresses and articles by Professor Hanus, most of them previously published elsewhere, have been collected in this book and thereby made permanently accessible for those who are interested in educational matters. The chapter headings indicate the range of the book:

Educational Aims and Educational Values; The Recent Tendency in Secondary Education Examined; Attempted Improvement in the Course of Study; What Should the Modern Secondary School Aim to Accomplish; Secondary Education as a Unifying Force in American Life; The Preparation of the High School Teacher of Mathematics; The Study of Education in Harvard University; The Permanent Influence of John Amos Comenius.

Professor Hanus's book is refreshing in this day of many educational publications, because of its clear and interesting analysis of specific conditions in contrast to the groping generalizations to which we have become so accustomed. The book is very suggestive throughout and must help to a juster valuing of the various forms of educational effort.

G. W. F.

Indian Club-Swinging. One, Two and Three Club-Juggling. Frank E. Miller, Y. M. C. A., Dallas, Texas. The Saalfield Publishing Co., Akron, O., 1900. Pp. 182, $1.00; 52 half-tone illustrations and 2 diagrams.

Mr. Miller's aim in preparing this book was the introduction of a simple nomenclature for club-swinging and club-juggling, the presentation of the work in such a way that it could be given on the gymnasium floor, and the provision of exercise for those

who desire to practice advanced club-swinging and juggling. He emphasizes the values of club-swinging as a means of exercise, and has arranged his book so as to permit of its use by the individual or by the teacher. The illustrations are unusually good, the text clear and the directions simple and accurate. As a text-book of club-swinging, it occupies a unique position, since it is written from the comprehensive, educational standpoint of the successful teacher, rather than from that of the mere technical expert.

G. W. F.

School Gymnastics with Light Apparatus. Jessie H. Bancroft, Director of Physical Training, New York City, Borough of Brooklyn. D. C. Heath & Co., Boston, 1900. Pp. 506. Profusely illustrated. $1.75. Also published in three parts, at 75 cents each.

The need for special text-books of gymnastics embodying personal methods has led many teachers of gymnastics to become authors and the market is more or less flooded with these special treatises. The young graduate of a normal school who desires a text-book to assist him in shaping the course of his work and in adapting the work to grades, is greatly confused by this multiplicity of treatises. Among others, Miss Bancroft has felt the need of a more comprehensive text-book, and has undertaken to supply the need. The somewhat bulky and expensive volume shows that she has preferred to make her work more or less independent of others by the inclusion of structural details. The book is not a mere arrangement and classification of exercises available for different grades; for each exercise it gives a detailed description with half-tone illustration and commands, so that the most inexperienced teacher has the needed instruction. Very sensible preliminary notes upon methods of teaching are also given. The main emphasis of the book is laid upon the grade divisions, which are thus made to form the centres for the grouping of each series of exercises.

Miss Bancroft has been specially fortunate in her success in avoiding the sacrifice of definiteness to variety, at the same time maintaining the interest and adequacy of the exercises. As in her first book, on Free Hand Gymnastics, she has shown her ability to use her knowledge of the Swedish system of gymnastics for

legitimate results, without being a slave to either the Swedish theory or practice, as so many recent writers have shown themselves to be. The demand for progression in gymnastics by teachers and school superintendents who seem able to gauge the possibilities of advancement in physical power solely by the ability of the teacher to give a new form of daily exercise (day's order) undoubtedly is accountable for this condition of affairs. Miss Bancroft is to be congratulated upon her contribution to the success of the teacher and to the broader physical culture of the children.

G. W. F.

Course of Study, Chicago Institute, Chicago, Ill. Volume I, Nos. 1, 2 and 3, 1900.

The Chicago Institute has for its aim the formulation of an ideal course of study and for the furtherance of this aim issues monthly a magazine which consists of fifty to one hundred pages, devoted to the outlines of the work to be taken up in the coming month in each subject. These outlines are of much interest and cannot but be of value to many teachers. The fact that the directions and suggestions are made for pupil-teachers, who need instruction in the rudiments of the subject, disarms criticism in regard to the repetition and "catch phrase" wording which are somewhat characteristic of them.

The notes on physical training are of especial interest to us who look to this school to be an exponent of the ideal relation of physical training to school work. The fullness of direction given, not only under the topic Physical Training, but in connection with the detailed outlines of grade work for the month, is especially gratifying.

In the second number of the publication is given a copy of the blank used for measurements. This includes over 60 direct measurements or observations, as height of body and of various parts, girths of all prominent parts, depths of chest and abdomen, breadths of main parts, various lengths, strength of lungs, back, legs, chest, etc., together with notes on development, condition, vision, pilosity, color of hair, eyes, temperament, etc. Connected with these are questions to be answered by the pupils with regard to nationality, heredity, deaths of immediate relatives, and a list of thirty diseases and conditions. This is an exact copy in extenso

of Dr. Sargent's list (though we look in vain for credit or explanation of the gross plagiarism) which he has so long used for college and school physical examinations, and its adoption by the Chicago Institute, in however questionable manner, will doubtless result in more complete statistics of individual measurements of children than are now accessible. The test of the success of physical training is, according to the statement of the department, "increased self-control and power to study, to reason, to express thought." It is to be regretted that this statement is not made more complete. These tests are sufficiently severe, but may they not be somewhat unjust to the subject? Increase of self-control, increase of power to study, to reason and to express thought, accompany increased age and general school work. The superiority of one group of children with this advantage over another group of the same age without it, will of course be the real test, and its result will be awaited with much interest.

It is to be regretted that some of the statements made are so general as to be quite misleading, while others are more definite than the present results of investigation are thought to warrant. The following may be taken as illustrations:

"Nutrition and Assimilation.—The blood tests reveal the possibility of growth under individual conditions of nutrition and hygienic environment. It is important to stuuy the amount and kind of food in attempting to develop the individual.

"Sense Tests.—Vision and hearing are factors in both mental and physical development. Weakness in senses may react to produce weakness of the whole body.

"Fatigue.—Mental and physical fatigue is watched through the dermal sensibility. Tests illustrating this point will be printed in future numbers of the Course of Study."

The confidence of statement in regard to blood tests and fatigue tests through dermal sensibility is somewhat in contrast to the attitude assumed by students of these matters. The statement that the air temperature for exercise should be 68 degrees is doubtless a misprint, since 55 or 60 degrees is generally acknowledged to be more desirable.

The outline for the course in physical training is, on the whole, comprehensive and suggestive, and its development in future numbers of the Course of Study will be awaited with interest.

G. W. F.

MIND AND BODY, MILWAUKEE, WIS:

September, 1900: Mental Hygiene, by Hermann Otto Dreisel; Physical Culture in Terre Haute, Ind.; A Lesson in Tennis; Outline of the Course of Study in Physical Training at the Chicago Institute, Carl J. Kroh, Caroline Crawford; The Evils of Tight Lacing; Bathing; Extracts from European Journals of Physical Training, by Carl L. Schrader; The Rights of the Child; The Growth of Boys; Plans for New Gymnasium for the Chicago University; Athletics Abroad.

October: Physical Training from an Ethical, Physiological, and Psychological View, Hans Ballin; Physical Training in English Schools, H. Brown; Rules for Games, Jessie H. Bancroft; A Rival of Basket-Ball, William W. Hastings.

CHILD-STUDY MONTHLY, CHICAGO, ILL.

September, 1900: Origin and Development of the Emotional Nature, Hiram W. Slack; Against Kindergarten, Ruth Everett; The Work of the New York Society for Child-Study, Edward F. Buchner; Perversion Through Environment, Maximilian P. E. Groszman; Our Boys; A. P. H.; What Great Writers See In Children, Mary S. Taylor.

October: Child-Study in Chicago Schools, W. S. Christopher, M.D.; Desks That Fit, C. Victor Campbell; A Vienna Estimate of a Chicago Innovation, D. P. MacMillan, Ph.D.; The Purpose and Scope of Padology, Oscar Chrisman, Ph.D.; Child Nature a Factor in Evolution, C. Victor Campbell.

THE DIETETIC AND HYGIENIC GAZETTE, NEW YORK, N. Y.

September, 1900: Do Americans Exercise Too Violently?; Massage for Chronic Catarrh; Water as a Promoter of Health and Happiness; The Increase of Insanity; Imagination and Disease; The Chinese Mode of Feeling the Pulse; Secret of Longevity.

October: The Recognition of Physical Training in the Scheme of Universal Education; Physical Education in the Public Schools of Philadelphia, Pa.; Bicycle Clubs for Home Defence; Bicycling; Some Practical Hints on Massage; Gymnastic Columns in Periodicals; Gymnastics for Women; Temperature for Mental Work.

November: Beauty as a Means of Health; The Need of Exercise; Treatment of Pulmonary Tuberculosis; Fresh Air for

Schools; Massage in Peri-Articular Fractures; Exercises as a Curative Agent; Physical Training—Its Range and Usefulness in Therapeutics; Physical Training as the Basis of Health, Strength, and Grace, W. R. C. Latson, M.D.; Nose Breathing.

EDUCATIONAL REVIEW, NEW YORK, N. Y.

October, 1900: Relation of Women to the Trades and Professions, William T. Harris; The Cuban Teachers at Harvard, Roger Clapp; Transportation of Rural School Children at Public Expense, A. A. Upham; Principals' Reports on Teachers, F. Louis Soldan; The Big Red Schoolhouse, Elizabeth M. Howe; Democracy and Education in England, W. G. Field; Recent Italian Educational Literature, A. F. Chamberlain.

November: Education as World-Building, Thomas Davidson; An Ethnic View of Higher Education, I. W. Howerth; The Private Secondary School for Girls, Louise S. B. Saunders; Private Schools for Boys, Lawrence C. Hull; Newer Ideas in Agricultural Education, L. H. Bailey; Training Teachers in France, Lucy M. Salmon; German Higher Schools, Elmer E. Brown; Discussion, Teaching as a Profession—a Protest, Carolyn Shipman.

JOURNAL OF PEDAGOGY, SYRACUSE, N. Y.

October, 1900: Studies in Genetic Psychology, Charles H. Judd; The Cause of Chronic Bad Spelling, E. Kate Carmen; The Socratic Method, Arthur Allin; Development of the Social Aim in Education, I. W. Howerth; Humane Instincts of Children, Bertha E. Emmons; Concerning Grumblers, Eva March Tappan; Differentiation and Environment in Modern Language Instruction, M. D. Learned.

POSSE GYMNASIUM JOURNAL, BOSTON, MASS.

July, 1900: Workers and Fatigue; The Physical Basis of General Qualities of Mind and Soul, by Baron Nils Posse; Infection from Germs; For Those Who Wish to Live a Hundred Years; Salads as Tonics; A Strong Baby; Hydropathy in Persia in 1674.

September: A Discussion of the Value of Drills; The Physical Basis of General Qualities of Mind and Soul, by Baron Nils Posse; The Reflex Influence of the Teacher's Calling, President Angell; Declaration of Principles (as adopted by the N. E. A. at its Charleston meeting, July, 1900.)

October: Gymnastics in Toledo Public Schools; What Are Swedish Gymnastics? M. P. Clough; The Physical Basis of General Qualities of Mind and Soul, Baron Nils Posse; The Woman's Gymnasium at the University of Michigan; Ambidexterity; The Twenty-Eighth Festival of the North American Gymnastic Union; London (Royal Free Hospital) School of Medicine for Women, Miss L. B. Aldrich-Blake, M.D.; Physiology of Voice Production.

THE SCHOOL JOURNAL, NEW YORK, N. Y.

September 29th, 1900: A Renewed Educational Spirit, by James M. Greenwood, Kansas City, Mo.; Evolution and Environment, by E. P. Powell, Clinton, N. Y.; The Psychological Child.

October 20th: Evolution and Education by E. P. Powell, Clinton, N. Y.; Reform Schools and Truant Schools: An Inquiry into their Methods and Results, by M. W. Vanderburg, M.D., Mt. Vernon, N. Y.

THE ELEMENTARY SCHOOL RECORD, UNIVERSITY OF CHICAGO, CHICAGO, ILL.

No. 6. Science in Elementary Education, Katherine B. Camp; School Reports.

No. 7. Manual Training, Frank H. Ball; School Reports.

No. 8. The Aim of History in Elementary Education, Dr. John Dewey; History, Miss Georgia F. Bacon; School Reports.

EDUCATION, BOSTON, MASS.

October: The Problems which Confront the Academy at the Opening of the Twentieth Century, G. D. Pettee, A. L. Lane, J. C. MacKenzie, Alexis Grant; An Address to High School Assistants, Samuel Thurber; Nature Lessons, John F. Bradley; The Public Press and the Public School, E. L. Cowdrick; Ruskin's Educational Views, E. A. Knapp; Educational Facts for Today, F. H. K.; The Educational Congresses at Paris, Anna T. Smith.

November: Problems which Confront the High School at the Opening of the Twentieth Century, Ray Greene Huling, H. L. Boltwood, Charles C. Ramsay, A. W. Bacheler; Education and Morals, Hon. Boyd Winchester; Temperance Instruction in School, A. T. S.

December: Problems which Confront the Public School at the Opening of the Twentieth Century, A. Gove, J. M. Greenwood, C. B. Gilbert, A. D. Mayo; R. H. Quick, on Examinations, Henry Sabin; High School Reform, Charles M. Clay; Progress and Providence, John Ogden; A New Departure in Education, H. M. Hodgman; The Pinebluff Sanitary School; The State Simplification of French Syntax.

DIE KINDERFEHLER, LANGENSALZA, GERMANY.

September, 1900: The treatment of the deaf and dumb in our Public Schools, H. Schreiber; The Physiological Foundations of a Rational Bodily Physical Education for Abnormal Children, J. DeMoor; The Childish Defect of Obstinacy, Hermann Grünewald; The Care of Our Socially Imperiled Youth, Tr.; Medicine and Pedagogics, Otto Schmitt; Auguste Frese, O. Danger; The Second Meeting of the German Association for Child Study, A Neufeld; Communication to the Members and Friends of the German Association for Child Study; Professor Dr. Th. Ziehen.

THE GYMNASIUM, LONDON, ENGLAND.

September, 1900: Brain, Muscle and Diet; Concerning Gymnastic Teachers; Swiss Festival; Gymnastics for Girls; Mass Free Exercises; National Physical Recreation Society--Physical Tests.

October: Representative Gymnastic Teachers, George Matthews; Swiss National Gymnastic Festival; Conditions of the National Physical Recreation Society's 200-Guinea International Challenge Shield Competition; Representative Gymnastic Teachers, Arthur P. Clague; Echoes from Paris—The International Championship; Coming Events; The Question of "Exercise"; Physical Exercises and the Brain; National Physical Recreation Society.

November: Japanese Wrestling; Group of Sunderland Y. M. C. A. Gymnasts; Diet; International Congress of Physical Education—Paris; National Society of Physical Education; Hints to Gymnasts; Physical Man; Concerning Gymnastic Teachers; N. P. R. S. Physical Tests.

DEUTSCHE TURN-ZEITUNG, LEIPSIC, GERMANY, 1900. VOL. XLV.

No. 31 (August 2nd). Statistics of the German Turnerschaft as it was on January 1st, 1900, by Dr. Rühl (concluded); Cotillion Flower-Reigen by Rud. Reinhold.

No. 32 (August 9th). Proceedings of the meeting of the Executive Board of the Turnerschaft at Salzburg, July 29th and 30th; March and Tactic Exercises alternating with Dumb-Bell Exercises as executed by 96 scholars at Berlin, by E. Kregenow.

No. 33 (August 16th). Life Memories, by Carl Euler (continued in No. 43); Flag-Reigen for Women, by J. Reinhardt; Material for the History of German Gymnastics, XIX, by M. Zettler (concluded in No. 34).

No. 34 (August 23rd). Competitive Games or Exhibition Games? by Dr. Neuendorf; The Years of Organization of the Turnvereine, by Fr. Götz; Groups of Exercises on the horse with three pommels.

No. 35 (August 30th). Friedrich Ludwig Jahn's first publication of one hundred years ago, on "The Promotion of Patriotism in the Kingdom of Prussia," by Carl Euler; Dance-Reigen for Ladies and Gentlemen, by L. Schützer (concluded in No. 36); Iron Wand Exercises, by Conrad Böcker; A German Mountain Festival in the Nordmark, by Dr. H. Gerstenberg.

No. 36 (September 6th). Glances into the History of Gymnastics, by A. Thoma; IX, The Humanists and their Influence in the Field of Physical Education; The Festival of the Swiss Gymnastic Federation (das Eidgenössische Turnfest) at La Chaux de Fonds, August 4th-7th, 1900, by Karl Wehner; The International Gymnastic Competitions at Paris, by Theodor Wohleath.

No. 37 (September 13th). Gymnastic and other observations at Paris during the World's Exposition, by Dr. Burgass (continued in Nos. 38 and 40).

No. 38 (September 20th). The meetings of the German Teachers of Gymnastics, by C. Böttcher, continued in Nos. 39, 42 and 44; Class Leaders gathering and instructions at Leipzig.

No. 39 (September 27th). March and Free Exercises, by Munier; A contribution on Chamber Gymnastics; A description of various machines for semi-passive movements.

No. 40 (October 4th). Italian opinion of German popular Gymnastics (vereinsturnen) and the Turnfest at Hamburg, by G. Retzdorf (concluded in No. 41); Sketch of building suitable for carrying out the exercises at a Turnfest in case of inclement weather, by Alfred; Indian Club, Dumb-Bell and Flag-Reigen, by Carl Finke.

No. 41 (October 11th). New School Gymnasia at Munich, by H. G. Weber; Groups of Indian Club exercises and of Fancy Steps, by Fr. Sauer; Material for the history of German Gymnastics, by M. Zettler.

No. 42 (October 18th). Convention of the Association of Gymnastic Teachers of Saxony and the 50th Anniversary of the Royal Gymnastic Normal School at Dresden, September 26th and 27th (concluded in Nos. 43 and 44); Groups of exercises for Horizontal Bar, Parallel Bars and Horse, by Aug. Wagner.

No. 43 (October 25th). Life Memories, by Carl Euler; Groups of Indian Club and Free Exercises, by G. Franke.

No. 44 (November 1st). 47th Annual meeting of the Swiss Association of Gymnastic Teachers.

No. 45 (November 8th). The Gymnastic Normal School at Dresden in its relations with school and popular gymnastics in Saxony, by M. Zettler (concluded in No. 46); Tactic and Free Exercises in the form of a Reigen, by Misselwitz; Dedication of new Gymnasium of the Turnverein of Eltville.

No. 46 (November 15th). Life Memories, by Carl Euler; Groups of Exercises for Flying Rings, by Fr. Herbst; Vaulting Table, Theo. Talman.

C. E.

BOLÉTIN DE ENSEÑANZA PRIMARIA, MONTEVIDEO, URUGUAY.

May and June, 1899: The Evolution of the Popular School, by J. H. Figueira; Translation of Article, by A. McDonald, of Washington, D. C., Concerning Measurements of Children taken in the United States; Translation of Article, by A. McDonald, on a "Study of the Anthropology and Psychologic Physiology of the School Children of Washington"; Reprint of a letter from the Executive to the Argentine Congress on "The Plan of General and University Instruction in the Argentine Republic"; The Examination and Promotion of Scholars; A General Idea of Anthropology and Its Divisions; The Hours for Class Work and the Application of the Children; Exercise for the Adult and Its Hygienic Effect, etc.

September and October, 1899: The Teaching of History in the Primary Schools, by J. H. Figueira; Reprint of an article on Studies Developed from Infant Psychology; Methods and Po-

sitions Assumed in Writing; Text-books, School Regulations and the Curriculum of the First to the Seventh Years, inclusive.

November and December, 1899: School Budget for the Current Year; General Directions for the Prevention of Whooping-Cough; Prevention of the Contagion and Spread of Measles.

M. H. B.

PUBLICATIONS RECEIVED.

The Ladies' Home Journal, Philadelphia, Pa., October.

The School Journal, New York, N. Y., weekly.

Mind and Body, Milwaukee, Wis., September and October.

The Digestibility and Nutritive Value of Bread, by Charles D. Woods and L. H. Merrill, Maine Agricultural Experiment Station. U. S. Dept. of Agriculture, Office of Experiment Stations, Washington, 1900.

Nutrition Investigations at the California Agricultural Experiment Station, 1896-1898, by M. E. Jaffa, University of California. U. S. Dept. of Agriculture, Office of Experiment Stations, Washington, 1900.

Child-Study Monthly, Chicago, Ill, October.

Health Culture, New York, N. Y., September, October and November.

Elementary School Record, University of Chicago Press, Chicago, Ill., No. 7, Manual Training; No. 8, History.

Ny Tidning för Idrott, Stockholm, Sweden, weekly.

Le Stand, Paris, France, weekly.

The School Journal, New York, N. Y., weekly.

The Dietetic and Hygienic Gazette, New York, N. Y., October and November.

Amerikanische Turnzeitung, Milwaukee, Wis., weekly.

Posse Gymnasium Journal, Boston, Mass., July, September and October.

Course of Study, Chicago Institute, Chicago, Ill., October and November.

Educational Review, New York, N. Y., October and November.

Physical Training in Massachusetts Normal Schools, by W. A. Baldwin, B. S., Hyannis, Mass. Paris Exposition, 1900.

Physical Training. Rules for Games. Elementary Schools. Borough of Brooklyn, Dept. of Education, New York, N. Y. Jessie H. Bancroft, Director of Physical Training, Edward G. Ward, Supt. of Schools. Adopted June, 1900.

Monthly Bulletin of the Statistics Department, City of Boston, Nos. 6, 7 and 8. Municipal Printing Office, Boston.

Journal of Pedagogy, Ypsilanti, Mich., October, 1900.

School Gymnastics with Light Apparatus. Jessie H. Bancroft, Brooklyn, N. Y. D. C. Heath & Co., 1900.

Indian Club Swinging. One, Two, and Three Club Juggling, by Frank E. Miller, Dallas, Texas. The Saalfield Publishing Co., Akron, O., 1900.

Physical Culture, B. F. Johnson, Primary Book. B. F. Johnson Publishing Co., Richmond, Va., 1900.

Report of Commissioner of Education, 1898-1899. Washington, Government Printing Office, 1900. Vol. I.

The Brooklyn Medical Journal, Brooklyn, N. Y., October and November.

Die Kinderfehler, Langensalza, Germany, September.

Exposé de L'Education Physique au Japon, by Dr. Yamane, Tokio, Japan. International Congress of Physical Education, Paris, 1900.

New York Education, Albany, N. Y. November, 1900.

A Brief Résumé of Quetelet's "TREATISE ON MAN."

By Wm. W. Hastings, University of Nebraska, Lincoln, Neb. Reprinted from the American Physical Education Review, Boston, Mass., 43 pages, 1 plate, tables, paper cover. Contents: The Influence of the Sexes upon the Number of Births; Professions Favorable to Phthisis; Professions Comparatively Free from Phthisis; Influence of Morals upon Mortality; Influence of Knowledge of Political and Religious Institutions upon Mortality; The Development of the Height; The Development of Weight and Its Relations to the Development of the Height of the Body; The Development of the Intellectual and Moral Qualities of Man; Quetelet's Conclusions on Crime; Appendices; Physiological and Pathological Statistics.

Quetelet's results remain of much interest and value and are thus made accessible to those who have not access to his treatise.

Price, 25c.; to members of the A. A. A. P. E., 20c.; for six or more copies, 15c. each.

LIST OF PUBLICATIONS OF THE A. A. A. P. E.

The following publications of the A. A. A. P. E. may be obtained from the Corresponding Secretary, G. W. Fitz, 483 Beacon Street, Boston, Mass., at the prices given below. The figures enclosed in parentheses indicate reduced prices to members:

Annual Report for 1885, pp. 8	$1.00	
Annual Report for 1886, pp. 35	Out of print.	
Reprint from Report for 1886, containing an address by Dr. E. Hitchcock and the Report of the Anthropometric Committee, pp. 17	0.50	
Annual Report for 1887, pp. 52	1.00	
Annual Report for 1888, pp. 56	1.00	
Conference Report for 1889, pp. 135 (bound)	1.00	
Annual Report for 1890, pp. 86	Out of print.	
Annual Report for 1891, pp. 127	1.00	
Annual Report for 1892, pp. 264	1.00	
Annual Report for 1893, pp. 66	1.00	
Annual Report for 1894, pp. 154	1.00	(0.50)
Annual Report for 1895, pp. 242	1.00	(0.50)
Index to the Annual Reports, by J. M. Pierce, pp. 11	0.05	
American Physical Education Review:		
Vol. I, 1896, pp. 128	0.75	(0.50)
Vol. II, 1897, pp. 264 [4 Nos. at 50c (25c) each]	1.50	(1.00)
Vol. III, 1898, pp. 322 [4 Nos. at 50c (25c) each]	1.50	(1.00)
Vol. IV, 1899, pp. 396 [4 Nos. at 50c (25c) each]	1.50	(1.00)
Vol. V, 1900, pp. 375 [4 Nos. at 50c (25c) each]	1.50	(1.00)
Physical Training, by E. M. Hartwell, M.D. (reprinted from Report of Bureau of Education) 1897-8, pp. 102 (487-589)	0.25	(0.20)
Athletics and Games of the Ancient Greeks, by E. M. Plummer, M.D. (reprinted from the Amer. Phys. Educ. Review), pp. 61	0.25	(0.20)
Mental Fatigue, by Herman T. Lukens (reprinted from the Amer. Phys. Educ. Review)	0.20	(0.16)
A Brief Résumé of Quetelet's "A Treatise on Man," by Wm. W. Hastings (reprinted from the American Physical Education Review), pp. 43	0.25	(0.20)
Reprint of Committee of Boston Phys. Educ. Society to Suggest a Substitute for the Manual of Arms as a Means of Physical Exercise in the Military Training of School Boys, pp. 7	0.05	
Constitution and By-Laws and Announcement and Appeal of the National Council of the A. A. A. P. E., pp. 14	0.02	
Bibliography Cards (see p. 66, Vol. III, of Review) on standard Library Bureau Cards; per thousand	3.00.	
Title-Page to Vols I, III, IV and V of the Review for binding, each	0.02	